A MONOGRAPH OF THE EMESINAE (REDUVIIDAE, HEMIPTERA)

PEDRO W. WYGODZINSKY

BULLETIN
OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
VOLUME 133 NEW YORK : 1966

A MONOGRAPH OF THE EMESINAE (REDUVIIDAE, HEMIPTERA)

PEDRO W. WYGODZINSKY

Curator, Department of Entomology
The American Museum of Natural History

BULLETIN
OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
VOLUME 133 NEW YORK : 1966

BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY

Volume 133, pages 1–614, text figures 1–181, plates 1–4, tables 1–5

Issued November 25, 1966

Price: $20.00 a copy

CONTENTS

INTRODUCTION

THE THREAD-LEGGED BUGS constituting the subfamily Emesinae of the Reduviidae have attracted more attention than most other reduviids. This special interest in the Emesinae is doubtlessly due to their often bizarre and strikingly slender body and appendages and has already produced one now outdated monograph on a worldwide basis (Dohrn, 1860, 1863) and several extensive, more recent, regional treatments (McAtee and Malloch, 1925, 1926; Villiers, 1949a; Wygodzinsky, 1956, 1958a; and Dispons and Stichel, 1959). However, no modern comprehensive survey of the group has been available. The present contribution is an attempt to gather, evaluate critically, and integrate published and newly obtained taxonomic information. Pertinent data on the structure, biology, and distribution of the Emesinae, on a worldwide basis, precede the systematic section.

The emphasis of this paper is on the tribal arrangement and the generic classification of the Emesinae, as a necessary base for a future analysis of the mutual affinities of the genera and lower hierarchical levels. The species are treated in detail only where necessary for a better understanding of the higher taxa.

This work is the outcome of projects begun independently by Dr. Robert L. Usinger and the author. I am deeply grateful for the unselfish assistance received from Usinger, who not only turned over to me all his extensive notes and permitted the use of his specimens, but who also generously shared his knowledge and experience. His friendship and constant encouragement have been essential factors toward the attainment of the present goal.

My thanks are also due to Dr. E. Gorton Linsley and Dr. R. F. Smith, former Chairman and present Chairman, respectively, of the Department of Entomology at the University of California at Berkeley during 1955 and 1961 when I had the privilege of doing research there, and where a great part of this work was carried out; and to Dr. Jerome G. Rozen, Jr., Chairman of the Department of Entomology of the American Museum of Natural History in New York, where the project was concluded. I am also very grateful to the John Simon Guggenheim Memorial Foundation, whose financial assistance has made it possible for me to devote more time to this study than would have been possible otherwise.

I am greatly obliged to Miss Ruth Tyler, Editor of the Scientific Publications of the American Museum of Natural History, for her patient help regarding the editorial aspect of this paper; to Mrs. Marjorie Favreau, of the Department of Entomology of the American Museum, for aid with some illustrations; and especially to my wife, Mrs. Betty Wygodzinsky, for her able assistance in preparing the final draft of the manuscript and for her untiring help and companionship which have assisted me greatly to overcome the most difficult phase of the project.

I am indebted to many colleagues and friends whose advice and help were so often sought and always so generously given, and to the authorities and curators of museums mentioned below whose material was examined during the course of the present work.

The following have made specimens available from their personal collections or from the institutional collections under their care, or have been otherwise of assistance: J. W. Abalos; C. P. Alexander; P. Ashlock; A. de Barros Machado; J. Becker; M. Beier; P. Brinck; J. Carayon; J. C. M. Carvalho; W. E. China; H. Clench; H. Daly; P. J. Darlington, Jr.; P. Dispons; C. Drake; J. Elkins; T. Farr; H. Freude; H. J. Grant; J. L. Gressitt; G. F. Gross; E. Halazfy; E. Handschin; K. Hayward; J. Herring; P. Hurd; R. Hussey; R. J. Izzard; F. Keiser; I. M. Kerzhner; G. Kuschel; J. Lattin; H. Lent; H. Lindberg; A. T. McClay; C. D. MacNeill; J. MacSwain; R. Malaise; J. Maldonado Capriles; S. Miyamoto; N. C. E. Miller; C. W. O'Brien; S. J. de Oliveira; L. E. Peña; J. Powell; L. Quate; J. Rageau; F. H. Rindge; E. S. Ross; H. Ruckes; H. Sachtleben; R. Sailer; R. Schuster; A. Smithers; H. Sturm; L. A. Terán; B. Torres; K. Toschi; F. Truxal; S. L. Tuxen; R. L.

Usinger; M. Viana; A. Villiers; G. E. Wallace; F. Werner; W. Weyrauch; and T. E. Woodward.

Emesinae are deposited in many private and public collections, which are indicated in each case under the specific headings in the Systematics section of this paper. For easy reference, the names of these collections are listed here alphabetically. The locations of these depositories are also given here but are not repeated in the Systematics part.

Private Collections

P. Ashlock, Honolulu, Hawaii
C. Drake, Washington, D. C., now in the United States National Museum, Smithsonian Institution
J. Elkins, Houston, Texas
L. E. Peña, Santiago, Chile
S. de Toledo Piza, Piracicaba, São Paulo, Brazil
A. Prosen, Buenos Aires, Argentina
R. L. Usinger, Berkeley, California

Public Collections

Academy of Natural Sciences of Philadelphia, Pennsylvania
The American Museum of Natural History, New York
Australian Museum, Sydney, Australia
Bernice P. Bishop Museum, Honolulu, Hawaii
British Museum (Natural History), London, England
California Academy of Sciences, San Francisco, California
California Insect Survey, University of California, Berkeley, California
Carnegie Museum, Pittsburgh, Pennsylvania
Cornell University, Department of Entomology, Ithaca, New York
Departamento de Zoologia, Secretaria de Agricultura, São Paulo, Brazil
Deutsches Entomologisches Institut, Eberswalde, Germany
Dominion Museum, Wellington, New Zealand
Entomology Branch, Department of Agriculture, Sydney, Australia
Hebrew University, Department of Zoology, Jerusalem, Israel
Hungarian National Museum, Budapest, Hungary
Imperial Museum, Tokyo, Japan
Institut Français d'Afrique Noire, Dakar, Senegal
Institut Français d'Océanie, Nouméa, New Caledonia
Institut des Parques Nationaux du Congo et du Rwanda, Brussels, Belgium
Institut de Recherche Scientifique de Madagascar, Tananarive, Malagasy Republic
Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium
Institute of Jamaica, Kingston, Jamaica
Instituto de Ecologia e Experimentação Agricolas, Rio de Janeiro, Brazil
Instituto Miguel Lillo, Tucumán, Argentina
Instituto de Higiene, Caracas, Venezuela
Instituto Nacional de Endemias Rurais, Belo Horizonte, Brazil
Instituto Oswaldo Cruz, Rio de Janeiro, Brazil
Instituto Sanchez Labrador, San Miguel, Argentina
Iowa State College, Ames, Iowa
Kyushu University, Biological Laboratory, Fukuoka, Japan
Los Angeles County Museum, Los Angeles, California
Misión de Estudios de Patalogía Regional Argentina, Buenos Aires, Argentina
Musée Royal de l'Afrique Centrale, Tervuren, Belgium
Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina
Museo de La Plata, La Plata, Argentina
Museu do Dundo, Dundo, Lunda, Angola
Museu Nacional, Rio de Janeiro, Brazil
Museum of Comparative Zoölogy, Cambridge, Massachusetts
Muséum National d'Histoire Naturelle, Paris, France
Museum of Natural History, Bucharest, Romania
Museum Zoologicum Bogoriense, Bogor, Indonesia
Museum Zoologicum Universitatis, Helsinki, Finland
Natal Museum, Pietermaritzburg, South Africa
National Museum, Prague, Czechoslovakia
Naturhistorisches Museum, Basel, Switzerland
Naturhistorisches Museum, Vienna, Austria
Naturhistoriska Museet, Göteborg, Sweden
Naturhistoriska Riksmuseet, Stockholm, Sweden
Oregon State University, Department of Entomology, Corvallis, Oregon
Purdue University, Lafayette, Indiana
Rijksmuseum van Natuurlijke Historie, Leiden, the Netherlands
Snow Entomological Museum, the University of Kansas, Lawrence, Kansas
Sociedad Claudio Gay, Santiago de Chile
South African Museum, Capetown, South Africa
South Australian Museum, Adelaide, Australia
Staten Island Museum, Staten Island, New York
Transvaal Museum, Pretoria, South Africa
United States National Museum, Smithsonian Institution, Washington, D. C.

Universidad de Chile, Centro de Investigaciones Zoológicas, Santiago, Chile
Universitetets Zoologisk Museum, Copenhagen, Denmark
University of Arizona, College of Agriculture, Department of Entomology, Tucson, Arizona
University of California, Department of Entomology, Davis, California
University of Michigan, Museum of Zoology, Ann Arbor, Michigan
University of Queensland, Department of Entomology, Brisbane, Australia
Zoological Institute, Lund University, Lund, Sweden
Zoological Institute of the Academy of Sciences, Leningrad, U.S.S.R.
Zoologisch Museum Amsterdam, Amsterdam, the Netherlands
Zoologische Sammlung des Bayrischen Staates, Munich, Germany
Zoologisches Museum der Humboldt-Universitaet, Berlin, Germany
Zoologisches Staatsinstitut und Zoologisches Museum, Hamburg, Germany

METHODS

McAtee and Malloch (1925) have expressed aptly a principle which is basic for all taxonomic work, and which I have tried to follow here: "There has been no greater retarding factor in systematic entomology than that of grafting supplementary work here and there upon the old, of using the characters and methods that have been used instead of seeking something of greater significance. Each new piece of synoptic work should penetrate as much further into the heart of things as possible, judiciously noting and using, but neither copying nor worshipping previous contributions to the study."

I have endeavored to take into account all morphological characters, used previously or not, that proved to be of value for the recognition and distinction of the various taxa of the Emesinae. The next section of this paper provides a short survey of the structures utilized for taxonomic purposes.

A somehow artificial but nevertheless useful distinction can be made between characters taken from the structure of the genitalia of both sexes and those pertaining to other parts of the body. The genitalia have furnished a wealth of usable characters, and they have been examined in detail whenever possible.

On the specific level, a distinct and constant difference in genitalic morphology has been interpreted as indicating specific difference; in all cases, such differences have been found to be associated with distinct, though in some cases subtle, differences in other morphological characters or in the color pattern. Inversely, in cases in which moderate dissimilarities in structural or color characters were not accompanied by clear-cut differences of the genitalia in at least one sex, I have assumed that only a single species is involved.

On the generic level, I have assumed a similar, though perhaps apparently more conservative, approach. Genera have here been basically delimited by morphological features not pertaining to the genitalia. In most but not all cases these generic characters are complemented by over-all differences in the genitalia in both sexes.

Inversely, constant over-all differences between the genitalia of given groups of species, if not accompanied by constant differences in other morphological characters, have not been used for the creation or recognition of separate genera.

I have attempted to arrive at an arrangement of the tribes of the Emesinae that in all probability reflects their origin in time and thus their relationships. On the other hand, I have not attempted to work out in detail the phylogenetic affinities of the genera within the tribes. In many instances it is obvious that given genera are most closely allied to certain others, but a comprehensive analysis of these relationships is beyond the scope of the present work. Therefore, though the arrangement of the tribes in the systematic part of this paper follows their probable phylogenetic sequence, the order of the genera within each tribe and that of the species within the genera is alphabetical. The arrangement of the taxa in the keys is equally not intended to indicate their phylogenetic order; the only purpose of the keys is that of identification.

Keys are given for all tribes and genera. Almost every specific key includes all species of the respective genus, but in the cosmopolitan genera (*Ploiaria*, *Gardena*, *Stenolemus*, and *Empicoris*) I found it necessary to use regional instead of worldwide keys. The characters serving to define a species in a key have often been taken from the literature because actual specimens could not be examined. It is hoped that the abundant references in the keys to illustrations in this paper will facilitate determinations. Whenever possible, external characters have been used, and only rarely has it been necessary to rely on features of the phallus for specific identification. It is regrettable that it was necessary to refer frequently to structural details of the forelegs; specimens lacking these appendages often cannot be identified by means of the keys.

The descriptions and redescriptions follow a uniform outline; considerable use has been made of illustrations. In all cases, I have attempted to illustrate for each genus either

the type species or a closely related one, in addition to any other illustrations that might be necessary to demonstrate the morphological variability of the genus or aid in the identification of its species. Unless otherwise indicated, the illustrations, including the photographs, were made by the author.

Synonymy for all taxa has been restricted here to the original description, primary synonymy, and the first reference to any combination other than the original one. Names are listed only with their author and date; the complete reference can be found in the Bibliography.

Type species are indicated for the genera, and, if known, the depository of the holotype is given for each species.

The distribution is indicated for all taxa, and, if material was examined during the preparation of this paper, full locality data are appended. Geographical terms are in some cases used instead of political ones. In this era of new nations some names, correct when the paper was written, may have changed by the time it is published.

The Bibliography is intended to include all papers containing significant taxonomic information and data pertaining to the morphology, biology, and distribution of the Emesinae; short faunistical notes and other items not contributing essential new information have not been listed.

Papers seen or received after January 1, 1965, have not been included in the Bibliography, nor have their contents been incorporated in the main part of the paper.

EXTERNAL STRUCTURE

THERE ARE TWO GROUPS of morphological phenomena that give the Emesinae their unique position within the family Reduviidae and that are of concern to the student of these insects. One is a trend toward a progressive narrowing of the body and a lengthening of the appendages, all reflected in numerous aspects of external and internal structure. The other is a frequent occurrence of sexual dimorphism and sometimes polymorphism, generally but not always expressed by the degree of wing development and concomitant morphological modifications of other body parts. A possibly related phenomenon is an unusual frequency of extreme reduction or complete loss of the forewings and hind wings in both sexes and in all specimens of a given taxon.

The following is intended to present and discuss some features of the morphology of the Emesinae, especially those that have bearing on the taxonomy and interpretation of the phylogeny and biology of the Emesinae.

SHAPE AND COLORATION

As we do not clearly understand the biological significance of the narrow body form, we do not know the mechanisms of selection that have contributed toward the attainment of the sometimes amazingly slender body shape of the Emesinae, e.g., *Ischnobaenella* (fig. 155A; pl. 2, fig. 5). The slender Metapterini, when motionless, are difficult to perceive visually among grasses, and the same is true for certain sticklike, forest-inhabiting forms. This possibly cryptic body shape may be enhanced by protective coloring, being light in grass-inhabiting, and dark for the forest, species. This interpretation is based on the fact that the Emesinae are nocturnal insects which rest during the daytime when potential visually oriented predators are active.

It is possible that the elongate body and appendages allow for a wider weight distribution, and therefore constitute a preadaptation for the life on spider webs taken up by many of the Emesinae. Similar morphological changes are observed frequently in cavernicolous arthropods; here again pre-adaptation may have favored the Emesinae, several of which have established themselves in caves.

Though many of the Emesinae are virtually concolorous, others possess complex color patterns, which also may be protective in function. Conspicuous markings on body and wings and annulations on the elongate appendages, or irregular body outlines as in *Dohrnemesa carvalhoi* (fig. 69A) and *Polauchenia marcapata* (fig. 89A), may assist the insect to blend into a mottled background or form disruptive patterns. The normal color scale of the markings extends from stramineous to brown and black; brilliant colors such as red, blue, or yellow have not developed to any significant extent. A remarkable exception is the Hawaiian *Nesidiolestes roberti*, which is green in life and blends perfectly with the color of the fern fronds on which the insects are found (R. L. Usinger, personal communication).

The color pattern, fairly constant within each species, is a useful taxonomic character in the group, mainly on the specific level. The over-all pattern tends to be somewhat similar within one genus, but in some instances such is not the case, and in such genera as *Ploiaria* or *Phasmatocoris*, virtually concolorous species occur with conspicuously marked ones. In the Leistarchini, rather dull-colored species prevail, but conspicuous markings are not unknown. Almost all the Emesini and Ploiariolini show striking color patterns. Delicately peppered species dominate in the Deliastini, and most of the Metapterini are more or less concolorous or delicately peppered. The illustrations accompanying the taxonomic part of this paper give an adequate impression of the range of color patterns found in the subfamily.

BODY SURFACE AND CHAETOTAXY

The body surface of the Emesinae is either smooth or sculptured; in the former case, it may be highly polished, especially the head and thorax (*Gardena*, *Protogardena*, *Phryxobotrys*, and others). Sculpture elements, when present, consist of delicate or

coarse striations, rugosities, or setiferous tubercles, or several of these elements combined. The absence or presence of granulations or tubercles can be a good taxonomic character: no tuberculate Emesini or Ploiariolini are known; some metapterine genera have tuberculate species but others do not, and no leistarchine genus has tuberculate species except *Ploiaria*, in which both smooth and granulate species exist.

The setae found on the body and appendages of the Emesinae are invariably simple, viz., never divided, barbed, feathered, or similarly modified. The most specialized are probably the capitate setae found on the under surface of the mid and hind tarsi of some species, which form a scopula when numerous (fig. 167F, I). The setae covering the body and appendages are generally pointed and of varied lengths. In addition to these setae, a second type, called "modified setae" in the present paper, is found in some of the Leistarchini, Deliastini, and especially in the Metapterini, mainly on the mid and hind legs and on the abdomen; they are generally wider than the normal bristles, and their point is either frequently very delicate and elongate (fig. 140E, N) or bluntly rounded (fig. 139E, N). All species of one genus may have the same type of modified setae, but within other genera there may be species with differently modified setae, e.g., in *Barce* (figs. 135C; 136H) or *Bargylia* (figs. 139E; 140E).

Often, on the abdomen as well as on the mid and hind legs, more numerous, rather uniformly distributed, smaller setae, here called microchaetae, are interspersed with less numerous, conspicuously larger bristles, the macrochaetae (fig. 4F, K). In the Collartidini, no distinction can be made between microchaetae and macrochaetae. In the Leistarchini, there are genera in which microchaetae and macrochaetae can be distinguished, and others in which the setae are uniform in size; in the genus *Ploiaria*, both species with and others without differentiated macrochaetae occur. In most of the Emesini, both microchaetae and macrochaetae are developed. In only the single species of *Armstrongocoris* and some of *Gardena*, a differentiation of the setae seems not to have taken place. Both microchaetae and macrochaetae are present in all Ploiariolini, but all Deliastini and Metapterini have uniform setae, except for *Emesaya* (fig. 142O) in which microchaetae and macrochaetae occur together. In some cases the macrochaetae of the mid and hind legs are very heavily sclerotized and quite short, being transformed into spines or spinulets (figs. 52H; 79J).

In some genera, long slender hairs form tufts or rings on the legs, viz., on the fore femora of *Ademula* (fig. 102M) and *Tridemula* (figs. 126T; 127C, G) and on the femora and tibiae of the mid and hind legs of many species of *Stenolemus* (figs. 98A; 100D). These groups of hairs furnish valuable taxonomic characters on the specific level. Their function is unknown.

Head

The structure of the emesine head does not depart in any significant way from that of the usual reduviid type. The general shape of the head is rather varied in minor details. Generally short and stout, the head has frequently become elongate-fusiform, as in the Collartidini (fig. 18A–C, E, F, W, X) and several of the Metapterini, e.g., *Bargylia* (figs. 137B; 139B) and some others, mainly as a consequence of an elongation of the anteocular and especially preantennal portion. The shapes of the anteocular and postocular regions of the head, viz., their outline in dorsal and lateral views, are useful taxonomic criteria, as are the relative sizes of the two portions. The dorsal interocular furrow may be relatively straight across (fig. 19A, B) or more or less curved backward (fig. 33A). True bucculae are not found but are simulated in one species of *Bobba* by parallel rows of coarse setiferous tubercules. The presence of regularly arranged, long, spinelike setae on the under surface of the head and usually but not invariably also on the opposed surface of the rostrum is here interpreted as a plesiomorphic trait, shared by all the Saicinae (fig. 18D) with both genera of the most plesiomorphic emesine tribe, the Collartidini (fig. 18C, F, W), several genera of the still relatively plesiomorphic Leistarchini (figs. 19C, E, F; 40E; 41B; 59B; 60B, C, E), and one of the geographically and taxonomically isolated Ploiariolini, the Hawaiian *Saicella* (fig. 123G, H). All the remaining Ploiariolini,

and the Emesini, Deliastini, and Metapterini, lack spines on the head and rostrum.

Simple in most tribes, the clypeus or the labrum or both are frequently tuberculiform or spiniform in the Metapterini (figs. 135A; 139B; and others). These characters generally are of not more than specific value.

The eyes vary from very large and almost meeting dorsally (*Collartida oculata*, fig. 18B, C) or ventrally (*Guithera feana*, fig. 32A–C), to extremely small, as in *Collartida microphthalma* (fig. 18A) and in most of the Metapterini (fig. 133A, B). The eyes of the males are in some cases larger than those of the females, as also in many otherwise sexually dimorphic species of *Ploiaria* or *Deliastes* (fig. 128A, D). The relative size of the eyes must be mentioned in all specific descriptions. Ocelli, absent from all the Saicinae and most of the Emesinae, are well developed in *Armstrongocoris* (fig. 65A–C) of the Australian Emesini.

Many taxonomic characters, either on the generic or on the specific level, involve the structure of the three-segmented rostrum and include the number and arrangement of spines, when present. The rostral segments are usually subcylindrical, but the second segment may be considerably swollen in some of the Emesini, especially in species of *Stenolemus* (fig. 98B, G), and in some of the Ploiariolini, such as *Calphurnioides* (fig. 106B) and *Emesopsis* (figs. 109E, K; 110K). The ratios of the lengths of the different segments are important taxonomically, especially at the generic level; for example, within the single tribe Metapterini we find the subequal rostral segments of *Anandromesa* (fig. 133C) or *Barce* (figs. 135A; 136C), the elongate first and conspicuously shortened second segment in *Bobba* (fig. 141B, W, EE, GG), and the strongly abbreviated basal segment in *Emesaya* (fig. 142B). The degree of bending between the first and second segments, from nil in *Barce* (figs. 135A; 136B, C, Y) and many others of the Metapterini to very pronounced in many of the Ploiariolini (figs. 115B; 116A; 119B), is important taxonomically, but the biological significance and possible phylogenetic implications are not understood.

The long and slender antennae of the Emesinae (pl. 2, figs. 5, 6; pl. 3, figs. 1, 4) are of much interest to the taxonomist. The position of the small antenniferous tubercle is characteristic for each genus. It may be situated either near the anterior border of the eyes, e.g., in *Myiophanes* (fig. 80B), at the extreme apex of the head as in *Emesaya* (fig. 142B), or at any intermediate point, frequently near the level of the center of the anteocular region, e.g., in *Bargylia* (fig. 137B). The antennae are mostly glabrous or covered only with minute setae, but in all tribes except the Metapterini males may have long ciliate hairs on the first and basal half of the second segment (figs. 56C; 57B); very rarely, similar hairs are found in the female.

A feature that deserves special attention is the relative length of the different antennal segments. Table 1 shows the ratios of the lengths of the antennal segments for a selected few of the Saicinae and Emesinae; the first segment, invariably much longer than the head, is taken as the unit of measurement. In this table, the higher taxa are arranged approximately in what I believe on other grounds to be a phylogenetic sequence. The table shows two parallel trends in the evolution of the ratios of the antennal segments. The second segment, roughly one-half as long as the first in the Saicinae and the plesiomorphic *Collartida* and *Armstrongula*, approaches very closely the length of the first segment in the remaining, apomorphic groups. Inversely, the third segment, half as long or more than half as long as the first in the plesiomorphic groups, becomes successively shorter in the more specialized forms. It decreases to such minute proportions as less than 0.02 of the length of the first segment in *Berlandiana decaryi*. A less spectacular trend toward a diminishing relative length is observable for the fourth antennal segment. The biological significance of these progressive changes is unknown.

Thorax

The emesine thorax in its plesiomorphic form, as found in *Armstrongocoris* (fig. 65A–C) and many other genera, is very similar to the generalized reduviid thorax, differing mainly by the obliquely forward-directed opening of the anterior acetabula. This character is shared by all the Emesinae

TABLE 1

RATIOS OF ANTENNAL SEGMENTS 1–4, WITH THE FIRST AS UNIT OF MEASUREMENT

Saicinae	
Carayonia sp.	1/0.37/0.76/0.93
Oncerotrachelus pallidus	1/0.76/0.56/0.76
Saica sp.	1/0.36/0.68/0.36
Tagalis sp.	1/0.64/0.55/0.35
Paratagalis spinosus	1/0.43/0.54/0.26
Emesinae	
Collartidini	
Collartida oculata	1/0.64/0.44/0.36
Leistarchini	
Armstrongula tillyardi	1/0.58/0.47/0.17
Guithera hortensia	1/0.61/0.29/0.5
Tinnunga macneilli	1/0.9/0.13/0.27
Ploiaria brincki	1/0.7/0.35/0.4
Ploiaria musgravei	1/0.95/0.14/0.2
Emesini	
Emesa mourei	1/0.9/0.25/0.21
Stenolemus larat	1/0.8/0.16/0.35
Stenolemopsis leechi	1/0.9/0.11/0.22
Myiophanes fluitaria	1/1.0/0.085/0.14
Eugubinus canalanus	1/1.0/0.04/0.2
Ploiariolini	
Tridemula sp.	1/0.95/0.5/0.21
Mesosepis papua	1/0.95/0.36/0.28
Calphurniella stheno	1/0.75/0.25/0.18
Saicella usingeri	1/0.9/0.19/0.16
Nesidiolestes roberti	1/1.0/0.17/0.23
Deliastini	
Stalemesa carvalhoi	1/0.8/0.15/0.32
Palacus sp.	1/0.85/0.09/?
Bergemesa brachmanni	1/1.05/0.06/0.18
Metapterini	
Bobba villiersi	1/0.8/0.12/0.28
Liaghinella farri	1/0.8/0.09/0.25
Metapterus linearis	1/0.7/0.07/0.23
Emesaya pollex	1/0.98/0.04/0.24
Nandariva kondoi	1/0.8/0.025/0.25
Berlandiana decaryi	1/0.82/0.018/0.22

and serves to distinguish them from the related Saicinae and all other reduviids. A well-developed stridulatory groove is invariably present. The generalized, rather stout thorax of the macropterous form (fig. 1A) has a fully developed, rather short pronotum, divided by a transverse, rather shallow constriction into a short fore and somewhat larger hind lobe; the latter covers the mesonotum to the base of the scutellum, which has a well-developed spiniform process. The short metanotum lacks a process.

The most noteworthy modification of the emesine thorax found in specialized members of the subfamily is in the structure of the prothorax; but in micropterous and apterous morpha, the remaining thoracic segments are equally subject to modifications, mainly in their proportions. For convenience, the thorax of the fully winged morph is discussed separately from that of the micropterous and apterous ones.

In the winged form, the tendency toward an elongation and narrowing of the emesine body is reflected also in the pronotum, especially in the fore lobe, the progressive narrowing and elongation of which is frequently accompanied by a more or less conspicuous constriction of its posterior portion (figs. 64B; 73A). This trend leads, especially in the tribe Emesini, to the formation of a pedunculate portion, the so-called petiole (figs. 1B; 71F; 100A, D; and others), which occasionally assumes extraordinary proportions, as in *Stenolemus giraffa* (fig. 98F).

The generally bell-shaped hind lobe of the pronotum is mostly simple in structure. Humeral projections, conical or spiniform, are found in some of the Emesini, viz., *Emesa*, *Phasmatocoris* (figs. 86A, B; 87A, B), *Polauchenia* (figs. 89A, B; 90A, B), *Schoutedenocoris* (figs. 92A, B), *Stenolemimus* (figs. 93A, B), and especially *Stenolemus*, in which discal projections are equally frequent or even the only ones (figs. 98A–C, E–G, M, P, Q; 99A–C; 100A, D). No humeral spines are found in the Ploiariolini, but the flaplike humeral projections of *Empicoris incredibilis* (fig. 113A, B) are remarkable. In this as well as in other species of *Empicoris* (figs. 112 O; 114A, S, U, V) and some *Calphurniella* (fig. 105A, B), *Emesopsis* (fig. 109E), and *Tridemula* (figs. 126R; 127B) a process is found at the center of the hind margin of the pronotum. In *Bagaudina*, the hind lobe of the pronotum is larger than usual and covers part of the scutellum and wing bases (fig. 24N, P).

A unique modification of the prothorax of many winged Emesinae, not found to my knowledge in other winged reduviids, is a reduction of the size of the hind lobe of the pronotum. In its typical form, the abbreviated hind lobe of the pronotum (fig. 1C) is very short and collar-like, covering

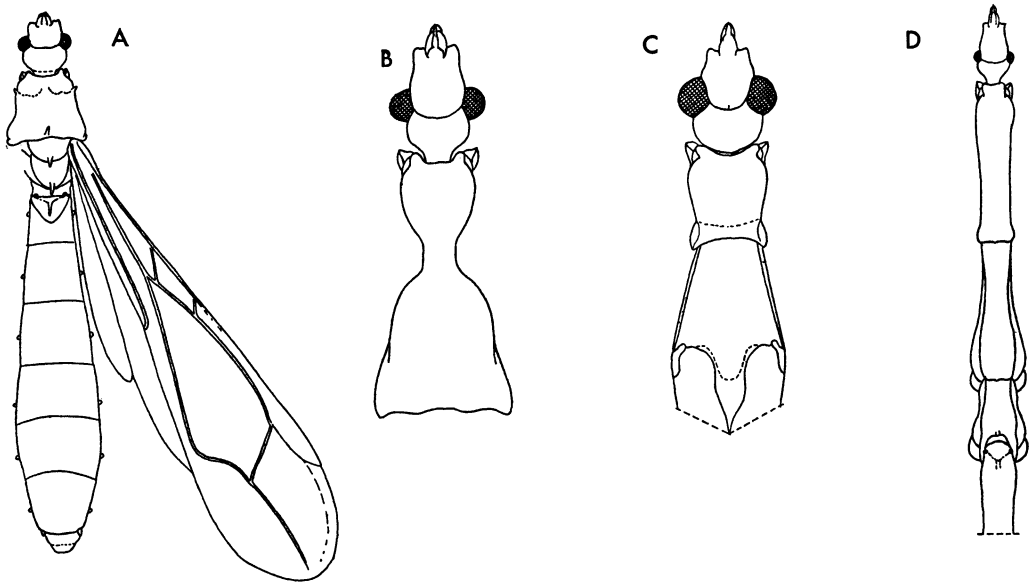


FIG. 1. A. *Empicoris* sp., dorsal view, schematic; wings of left side not shown. B. *Stenolemoides arizonensis*, head and prothorax, dorsal view. C. *Ploiaria carolina*, head and thorax, seen from above. D. *Ploiaria capeneri*, anterior portion of body, seen from above.

only a very small portion of the anterior end of the mesonotum. In some isolated instances, the reduction of the hind lobe is less striking; it then covers about one-third of the surface of the mesonotum, e.g., in *Barce werneri* (fig. 136W) or in *Lhostella* (fig. 36A–C, F). Though the extension of the hind lobe of the pronotum is generally uniform in all species of a given genus, *Barce* contains species in which the fully winged form has a complete pronotum, e.g., *Barce aberrans* (fig. 134A), others in which the reduction is extreme, i.e., *B. husseyi* (fig. 136A), and at least one in which an intermediate condition is encountered, i.e., *B. werneri* (fig. 136W). Fully winged forms with a reduced posterior pronotal lobe seemingly do not exist in the Emesini, the Ploiariolini, or the Deliastini. One of the two known collartidine genera, *Collartida* (fig. 18B), has a reduced pronotum; the other, *Stenorhamphus* (fig. 18X), a complete one. Also the remaining two tribes, the Leistarchini and the Metapterini, have both winged forms with normal, and others with reduced, pronota. Among the 17 leistarchine genera in which macropterous forms have been found, seven have complete pronota, e.g., *Bagauda* (fig. 22A), and 10 reduced ones, e.g., *Ploiaria* (fig. 56A). Of the eight metapterine genera with fully winged forms, four have a complete pronotum, e.g., *Emesaya* (fig. 142A), in three the hind lobe is strongly reduced, e.g., *Onychomesa* (fig. 166A), and in one, *Barce*, there occur species with complete and others with strongly reduced or intermediate posterior pronotal lobes, as detailed above. A well-developed posterior pronotal lobe overlying the mesonotum restricts severely the movements of the prothorax and with it the head and forelegs. The reduction of the posterior pronotal lobe, which then forms a ball-and-socket joint with the mesothorax, greatly enhances the mobility of the anterior extremity of the body, doubtlessly an advantage for a predaceous insect.

The posterior border of the prosternum may be emarginated, approximately straight, or rounded; its condition is used for the characterization of the leistarchine genera.

The mesothorax and metathorax of the winged form are shorter but more voluminous than the prothorax; they contain the greater part of the flight musculature. The great development of the mesothorax of *Mafulemesa* (fig. 37A, B) and *Phryxobotrys* (fig. 43A, B) is remarkable, but the reasons for this increase in size are not known. The

scutellum and exposed portion of the metanotum of the winged Emesinae are subtriangular and may bear spinelike projections. Scutellar and metanotal spines are generally not found when the posterior pronotal lobe is reduced; the only known exception is the leistarchine *Gnomocoris* (fig. 28G), which is also the only genus of the Leistarchini in which these spines occur at all. Scutellar, metanotal, or both kinds of spines exist in many but not all the Emesini and the Ploiariolini; their occurrence, size, and shape furnish generic and in some cases specific characters. A second metanotal spine, found in certain Saicinae, is unknown in the Emesinae, but the basal abdominal tergite of many of the Ploiariolini bears a spiniform process, bringing the total number of dorsal spines to three (figs. 102L; 107B; 115A). Mesonotal and metanotal spines are never found in the Deliastini and the Metapterini, a feature diagnostic for these tribes.

The pronotum of the great majority of the micropterous and apterous morpha is of the reduced type (figs. 1D; 101A, E; 128E, F). The partially reduced posterior pronotal lobe of *Saicella* (fig. 123C, H) and the virtually complete one of certain apterous Emesini (fig. 101B, D, F, G) are exceptional. Though in some cases short, and in extreme cases subglobular, in *Collartida* (fig. 18A), *Armstrongula*, and many others, the anterior portion of the prothorax of the micropterous and apterous Emesinae is generally elongate-subcylindrical (figs. 128E; 133A; and others) and very simple in structure. The mesonotum and metanotum vary in size. Both may be very short, e.g., in *Liaghinella* (fig. 162A), or the mesonotum (fig. 163B) or both mesonotum and metanotum (fig. 133B) may become elongate to a lesser or greater degree, in some cases extremely so, concomitantly with the pronotum, e.g., in *Ischnobaenella* (fig. 155A). The relative length of the mesonotum and metanotum and the ratio of mesonotum plus metanotum to pronotum are frequently used taxonomic characters, on the specific and generic levels. The thoracic nota of the micropterous and apterous forms are generally inermous, but spiniform projections are found in some species of *Ghilianella* (fig. 148E; pl. 3, fig. 6). An unidentified micropterous member of the Emesini has a short scutellar spine (fig. 101C, E), and both scutellar and metanotal spines are well developed in *Saicella* (fig. 123A, H).

Legs

The Emesinae walk only on their mid and hind legs; the forelegs are used for grasping and for cleaning; consequently, the structure of the forelegs is quite different from that of the hind legs; separate descriptions are advisable.

The forelegs are frequently just as stout as in other reduviids (fig. 2B), though they may become slender in very long and narrow species (figs. 74D; 155F).

One of the most important diagnostic characters of the Emesinae is the considerable elongation of the fore coxae (fig. 2A–C). With the probably insignificant exception of the ploiarioliine genus *Hybomatocoris*, in which the coxa is only three times as long as wide (fig. 116A, D), the coxa is normally at least four times as long as wide (fig. 2A–C), attaining a length of up to 20 times its maximum width in some metapterines, such as *Berlandiana*, *Ischnobaenella*, and others (figs. 140D; 155F). In most genera the coxae possess simple long and short hairs only. In some of the more plesiomorphic genera one or several spines or spinelike setae are found in addition to the hairs. This character is shared by these genera and the plesiomorphic sister group of the Emesinae, the Saicinae, in which spines on the fore coxa are almost universal (fig. 18D). These spines are present in fairly large numbers on the fore coxae of the adults (and very probably also the nymphs) of the plesiomorphic emesine tribe Collartidini (fig. 18F, J). A similar large number of coxal spines is found in the leistarchine genus *Armstrongula* (fig. 19D), which is also highly plesiomorphic in other respects. Other leistarchines in which coxal spines are found, though in small numbers, are *Tinnunga* (fig. 63D) and some *Tinna* (fig. 60H). The relict ploiarioline *Saicella* has a large number of well-developed coxal spines (fig. 123A, B, H) in adults as well as in nymphs. The only other ploiarioline in which a spined fore coxa is found is *Empicoris whitei*.

Among the other higher Emesinae, coxal spines have been found only in the first-instar

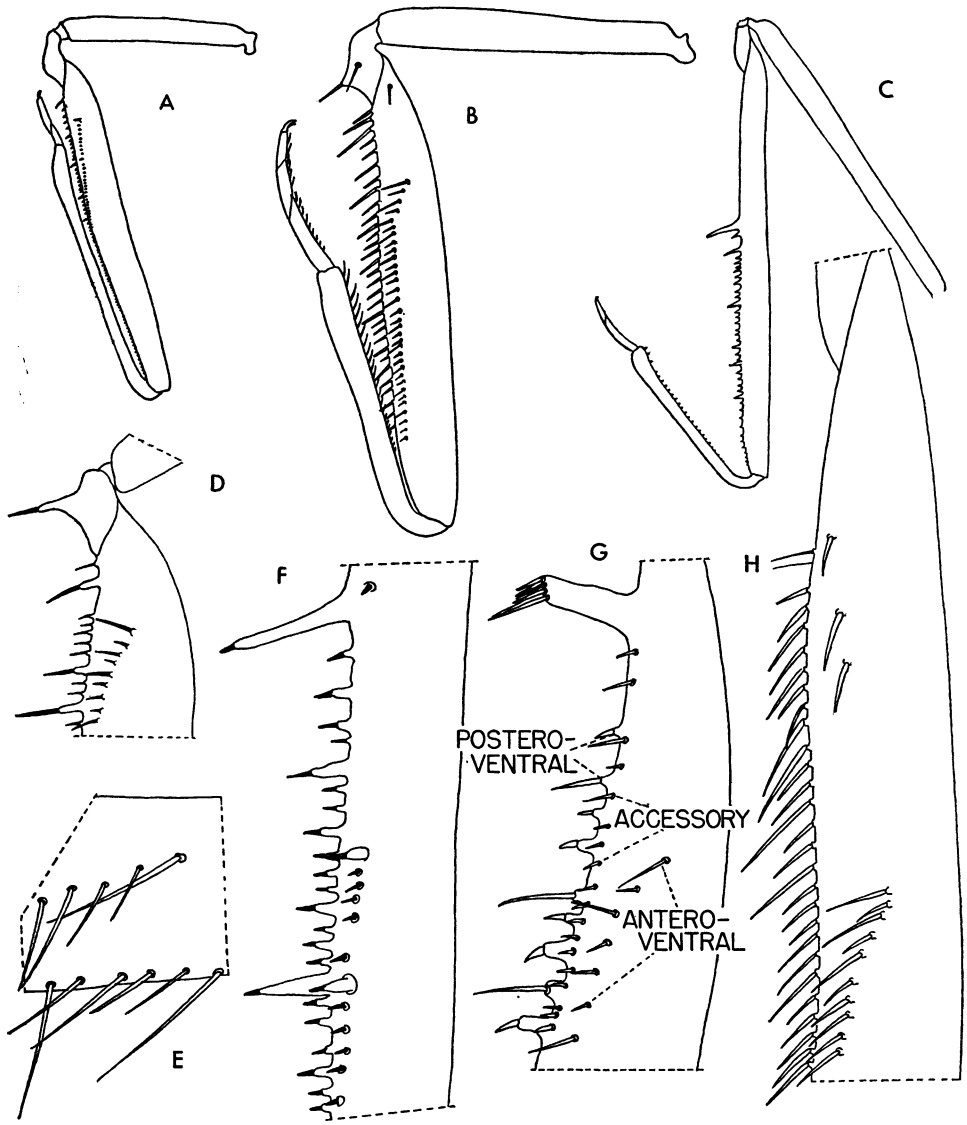


FIG. 2. A–C. Foreleg. A. *Calphurnioides malkini*. B. *Ploiaria cunnamulla*. C. *Pseudobargylia brewarrina*. D. *Ploiaria obscura*, trochanter and base of femur. E. *Ploiaria alexanderi*, base of anteroventral and portion of posteroventral series of fore femur. F–H. Portion of fore femur with bases of anteroventral and posteroventral series. F. *Onychomesa susainathani*. G. *Orthunga wahlbergi*. H. *Ploiaria* sp. (New Guinea).

nymph of *Bergemesa*, in which a single short spine is inserted on the upper surface of the article; the remaining nymphal instars and the adults lack this spine.

The progressive reduction of the coxal spines in the Emesinae is obviously correlated with their increasing evolutionary level. A similar phenomenon can be observed in the trochanteral spines. They are well developed in the primitive saicine *Carayonia* and most other members of this subfamily, the collartidine emesine *Collartida* (but not in *Stenorhamphus*), and several but not all leistarchine genera. In the last-named, they are present in *Armstrongula*, *Leistarches*, *Millotina*, and *Tinnunga*, as well as in some but not all species of *Tinna*, *Orthunga*, *Nesita*, and *Ploiaria*. The transition from very

heavily spined to completely glabrous trochantera can be observed especially well in *Ploiaria* (fig. 45D, G, O); the relative value of this character for taxonomic purposes in this genus becomes apparent. In several species of *Orthunga* and *Ploiaria* (fig. 46A, I), some of the trochanteral spines are inserted on conspicuous projections which may become as long as or longer than the width of the main body of the segment; in many of these cases, the under surface of the femur is provided with similar spiniferous projections. In the higher Emesinae, viz., Emesini, Deliastini, Metapterini, and Ploiariolini, the fore trochantera have no spines or projections (fig. 2A, C).

The femur is generally the stoutest segment of the forelegs. It invariably bears on its under surface at least two series of spinelike setae, spines, or denticles, or a combination of these, frequently inserted upon more or less conspicuous projections. The absence of these elements has been reported occasionally for certain species, but personal observations have shown this to be incorrect. The two series mentioned are the anteroventral and posteroventral series (fig. 2G), identified by their position as seen on the forwardly and slightly laterally held forelegs. In some cases, one or two accessory series, generally composed of very short spines or denticles, can be found (fig. 2G). These accessory series are well developed in the Collartidini and many of the Leistarchini, but they are found only rarely in the higher Emesinae.

The posteroventral series is composed of a relatively small number of large, more or less uniformly spaced spines or spiniferous tubercles, and a much larger number of medium-sized and small ones interspersed between the large ones (fig. 2D, F, G). The spines are rarely of subequal size; in such a case, as in some of the Leistarchini (fig. 2H) and occasional members of the Emesini (fig. 2E), the spines are inserted on very short, wartlike bases and are setae-like in appearance. In the same genera in which these conditions are encountered, species with a more normal armature also occur. The basal process of the posteroventral series is much larger than any of the others in some of the Leistarchini and all the Deliastini and Metapterini. The genesis of this large process is probably not the same in the groups mentioned. In the leistarchine genera in which this large basal process occurs (fig. 2G), it is penicillate, viz., it bears several spinelike setae on its apex and often on its sides. The hypothesis that the origin of this large basal projection is by fusion of several individual processes is strengthened by the aspect of the fore femur found in genera such as *Barrosia* (fig. 25N) and *Gnomocoris* (fig. 28D) in which this congregation takes place. In the Deliastini and the Metapterini, the large basal process bears a single apical spine (fig. 2F) and obviously corresponds to a single process only. Thus, it would seem that the appearance of a large basal process in the Leistarchini and the Deliastini plus the Metapterini must be considered a convergent feature; these processes are not strictly homologous. The extension of the posteroventral series furnishes valuable taxonomic data. In the plesiomorphic condition, as found in all Saicinae, the Collartidini, most of the Leistarchini and the Emesini, and all Ploiarioliini and Deliastini, the series begins at or very near the base of the article and extends virtually to its apex (fig. 2A, B). Among the Leistarchini, *Phryxobotrys* is the exception in that the posteroventral series begins at the middle of the article; the foreleg is also otherwise modified considerably (fig. 43J). A tendency for a shift of the beginning of the posteroventral series away from the base of the femur is observed in some species of *Phasmatocoris* (fig. 84D), and is even more noticeable in one species of *Eugubinus* (fig. 72CC) and most of those of *Gardena*. In the last-named genus, all stages from a series with maximum extension (fig. 75F) to conspicuously shortened ones (fig. 73F) can be found.

This tendency toward a removal of the beginning of the posteroventral series away from the base of the fore femur is especially strongly expressed in the Metapterini. The plesiomorphic condition is found in several genera, all composed of apterous, island-inhabiting forms: *Hornylia* (fig. 152C), *Leaylia* (fig. 159D), *Liaghinella* (fig. 162D), *Taitaia* (fig. 180F), and *Tubuataita* (fig. 181C). The apically directed movement of the base of the posteroventral series becomes

apparent in such genera as *Barce* (figs. 134F; 135J, X), *Bargylia* (figs. 138C, K; 139C), and *Bobba* (figs. 141C, W), in which the extreme base of the fore femur is devoid of spiniferous processes. It progresses in other genera, until the processes occupy slightly less than the apical half of the article, as in *Ischnobaena* (fig. 153D), *Leptinoschidium* (fig. 160R), *Pseudobargylia* (fig. 2C), and others.

The anteroventral series, though generally similar in its structure to the posteroventral one, is composed of relatively smaller spines or processes, the basal one in no case being conspicuously larger than any of the others. The series begins near or apicad of the level of the base of the posteroventral one. In many cases it is interrupted at its base (fig. 2B, H); this feature is of diagnostic value, mostly on the generic level, but some genera, such as *Ploiaria*, contain species with the interruption and others without. Frequently, a single spine or seta is found basad of the

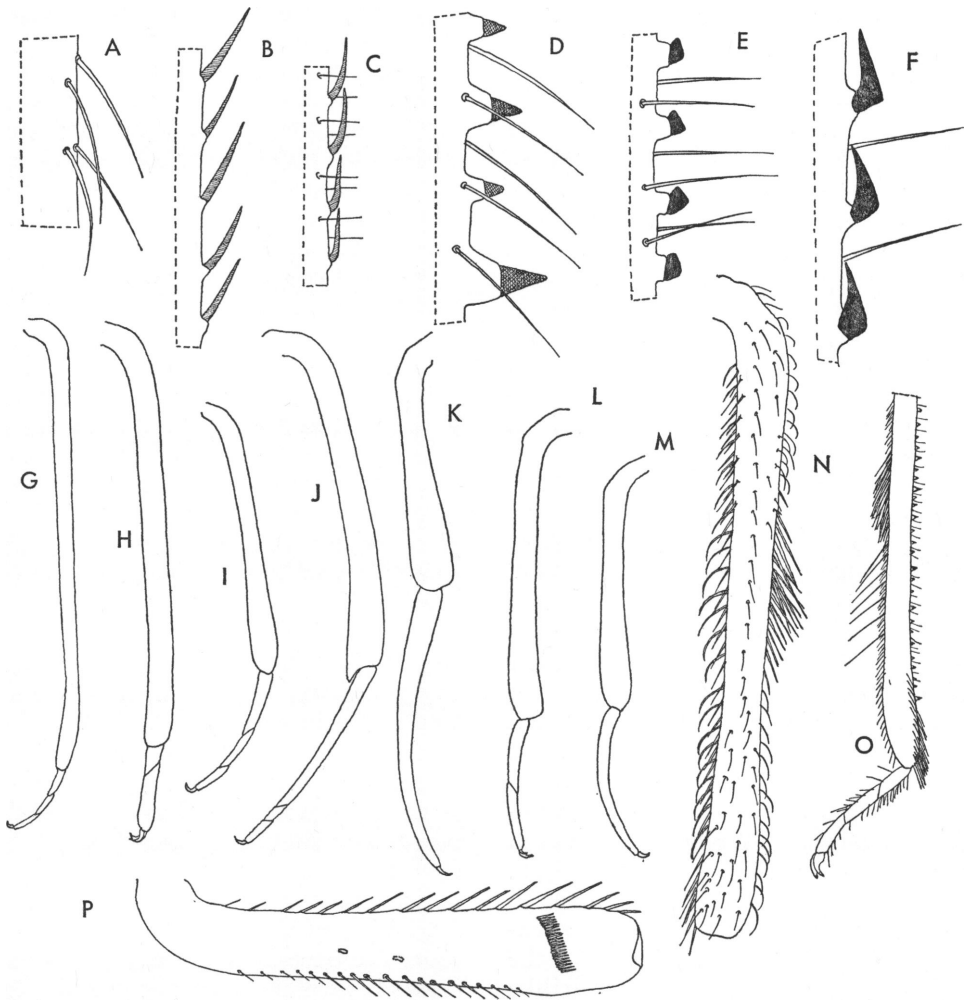


FIG. 3. A–F. Detail of under surface of fore tibia. A. *Empicoris rubromaculatus*. B. *Ploiaria chilensis*. C. *Bergemesa brachmanni*. D. *Emesa mourei*. E. *Gardena pipara*. F. *Emesella* sp. G–M. Fore tibia and tarsus, schematic. G. *Gardena pipara*. H. *Stenolemus perplexus*. I. *Ploiaria chilensis*. J. *Bagauda lucifugus*. K. *Orthunga wahlbergi*. L. *Bergemesa brachmanni*. M. *Barce aberrans*. N. *Empicoris culiciformis*, fore tibia. O. *Eugubinus canalanus*, apical portion of fore tibia and tarsus. P. *Ploiaria brincki*, fore tibia, to show location of protibial sensory elements at center of article.

interruption (fig. 2B); in other species, the number of setae is greater (fig. 2H).

The fore tibia of the Emesinae also provides the taxonomist with useful characters. In its plesiomorphic condition, the tibia is about four-fifths as long as the femur, much as in the Saicinae and most of the other Reduviidae. This condition prevails in the Collartidini and most of the Emesini and the Ploiarioliini (fig. 2A). A more or less conspicuous tendency for shortening of the fore tibiae is found in the remaining tribes. In the Leistarchini, the tibia in some genera is still about three-fourths as long as the femur (fig. 2B), but in most the tibia is considerably shortened, not surpassing one-fourth of the length of the femur in one extreme case (*Phryxobotrys*, fig. 43J). In the Emesini, the tibia becomes shortened only occasionally, as in *Phasmatocoris* (figs. 84D; 88J), one species of *Eugubinus* (fig. 72CC), and some *Gardena* (figs. 73F, FF; 74D).

In the three genera of the Deliastini, the fore tibia is half as long as the femur (figs. 129A; 130C; 132D). Its relative length is virtually the same in first-instar nymphs, at least in the genus *Bergemesa* (Wygodzinsky, 1950d).

The reduction of the relative size of the fore tibia is equally conspicuous in the Metapterini, in which its length fluctuates from being slightly over one-half (*Taitaia*) to only one-fourth (e.g., *Leptinoschidium*) of the length of the femur; in most genera it is shorter than half of the length of the femur (fig. 2C).

The dorsal surface of the fore tibia of many of the Emesinae bears a more or less extended group of serially arranged stiff bristles obliquely inclined apicad (fig. 3N, O), which somewhat resembles the calamistrum found on the metatarsus of the hind legs in cribellate spiders. Spiders use the calamistrum as a carding apparatus. The existence of a similar structure in the frequently arachnophilous Emesinae is suggestive of a comparable function of this organ. This calamistrum-like structure has not been found in *Carayonia* or any other genera of the Saicinae and is lacking in *Collartida*. It is present in the four genera of the Ploiariolini and the seven of the Emesini examined, but only in one each of six genera of the Leistarchini and seven of the Metapterini. It may be significant that the only metapterine genus equipped with this group of bristles is *Emesaya*, a genus very frequently associated with spider webs. The position and extension of the calamistrum-like group of setae vary from one genus to another and even within the genera. Table 2 shows the position and extension of the "calamistrum" on the tibia.

TABLE 2

RELATIVE POSITION OF CALAMISTRUM-LIKE STRUCTURE ON THE FORE TIBIA OF SOME OF THE EMESINAE, EXPRESSED BY DIVISION OF THE FORE TIBIA INTO 100 UNITS (BEGINNING AT ITS BASE)

	Units Between Which Structure Lies
Leistarchini	
Gomesius hesione	44–89
Emesinae	
Dohrnemesa lanei	69–83
Emesa mourei	64–82
Eugubinus canalanus	61–74
Gardena domitia	16–50
Gardena muscicapa	20–50
Gardena pipara	15–49.5
Phasmatocoris minor	60–90
Phasmatocoris praecellens	70–90
Protogardena boliviana	19.5–66
Stenolemus cf. *perplexus*	69–86
Stenolemus plaumanni	55–81
Stenolemus plumosus	17–35
Ploiariolini	
Emesopsis nubilus	45–69
Empicoris culiciformis	35–57
Empicoris mirabundus	23–38
Hybomatocoris penai	63–80
Nesidiolestes roberti	50–70
Metapterini	
Emesaya brevipennis	28–56

The ventral surface of the fore tibia normally has two rows of spinelike setae or spines. In the Ploiariolini, these spines are so much reduced as to be hardly if at all distinguishable from the ordinary setae covering the article (fig. 3A, N). In the other tribes, these structures may assume various shapes, generally characteristic for each genus, though in some cases, for instance in *Ploiaria*, different species or species groups

may have very different tibial armatures (figs. 44L; 50P; 51I; 53I; 54H, W; and others). Figure 3B and F also shows some of the shapes these spines may assume.

On the fore tibiae of many emesines, small but conspicuous structures, possibly representing campaniform sensillae or very small tympani, can be found. In most cases, there are two of these formations, one on the outer and the other on the inner surface of the tibiae, though in no instance directly opposite each other (figs. 3P; 156E). The approximate aspect of these elements under high magnification is as shown in figure 156F and G. Their exact location varies from one taxon to the other (figs. 3P; 156F) but is constant within each taxon. The taxonomic importance of the number and especially the position of these protibial structures deserves exploration.

These formations have been found in representatives of all emesine tribes, including the Collartidini, and are possibly present in most or all genera; I have not found them in the Saicinae or in any other reduviid.

Nothing is known about the anatomy or the function of these protibial elements, but it may safely be assumed that they are sensory. In this connection, it is interesting to note that emesines lift their forelegs and execute slow waving motions when in the proximity of prey. The protibial structures here described may be related to the perception of mechanical stimuli, especially air vibrations.

The fore tarsus is short, three-segmented, and hairy on all surfaces in its plesiomorphic condition, agreeing with that of the great majority of the Reduviidae. The Emesinae are characterized by a unique trend toward specialization of the fore tarsus, which is variously expressed by lengthening, reduction of the number of segments, and loss of setae concomitant with a heavier sclerotization.

The most plesiomorphic emesine, *Collartida*, possesses a fore tarsus entirely comparable to that of the plesiomorphic saicine *Carayonia* or any other less-modified reduviid. It is characterized not only by its relative shortness and the three movably articulated segments, which are hairy on all surfaces, but also by the fact that the first segment is shorter than any of the remaining (fig. 18J, O). In certain plesiomorphic leistarchine emesines, such as *Armstrongula*, most of the above plesiomorphic features are maintained, but the basal segment has become longer than any of the others (fig. 19D), a condition found throughout the rest of the subfamily. A three-segmented tarsus with movably articulated segments is also encountered in other leistarchine genera, viz., *Bagaudina*, *Tinna*, *Leistarches*, *Mafulemesa*, and *Ploiaria* (figs. 2B; 3I). Its length, though somewhat variable, does not surpass half of the length of the tibia, with the exception of some species of *Ploiaria* (figs. 45B; 46L). In a more specialized group of genera, viz., *Bagauda*, *Lhostella*, *Pseudobagauda*, and *Barrosia*, the tarsus, though still three-segmented, distinctly surpasses half of the length of the tibia, its segments lose their mobility, and the first is much longer than the remaining (fig. 3J); the setae are restricted mainly to the under surface of the tarsus, which has become more rigid, with a tendency to assume a curved shape. In the most highly modified genera, such as *Gomesius*, *Tinnunga*, *Orthunga*, *Atisne*, and *Nesita*, the tarsus attains or surpasses the tibia in length, all traces of segmentation have vanished on account of the final disappearance of the second and third segments, and the sclerotization and curvature have become more pronounced (fig. 3K). Though the condition of the fore tarsus furnishes valuable generic characters, the number of tarsal segments may be different in otherwise extremely closely related taxa. Species that agree in many synapomorphic characters and are united here under *Guithera* differ in the number of segments of the fore tarsus, one versus two, though the tarsi are quite similar in all other respects (figs. 32D; 34B, C). *Bagaudella*, here maintained as a full genus, is extremely close to *Guithera*, but its fore tarsus is three-segmented (fig. 34N), very similar to that of *Bagauda* and the related genera mentioned above.

In the Emesini, the fore tarsus is composed of three movably articulated segments (fig. 3G), rarely only two as in *Stenolemus* and its allies (fig. 3H). It is generally short (from one-seventh to one-fourth of the length of the tibia, fig. 3G, H), being half as long as the

tibia only in one quite aberrant species of *Phasmatocoris* (fig. 88J). Its setae are simple, but are slightly modified also in some species of *Phasmatocoris* (figs. 85G; 87F; 88L).

In the Ploiariolini, the fore tarsus is invariably short, and its segments are movably articulated. The number of the segments is generally two (figs. 2A; 4B), the second representing the fused second and third segments. In some genera there are still three segments, such as in *Malacopus* (fig. 118F, I), and in *Emesopsis* there are species with two-segmented and others with three-segmented fore tarsi (figs. 110C; 111I).

The fore tarsus of the Deliastini is two-segmented, bare above and at the sides, and from slightly less to much more than half as long as the tibia (figs. 3L; 129A, C; 130C; 132C, D).

In the Metapterini, the highest degree of specialization of the fore tarsus is found. Its length varies from one-third of that of the tibia, as in *Emesaya* (fig. 142F) and *Pseudobargylia*, to as long as that article, as in *Ghilianella* (fig. 146C) and *Hornylia*. It is three-segmented only in the relatively plesiomorphic *Emesaya* (fig. 142M), but its segments do not seem to be movably articulated, and its sides and dorsal surface are almost bare. A few genera have two-segmented fore tarsi, viz., *Ischnobaenella* (fig. 155E, F) and *Pseudobargylia* (fig. 170F, G); this reduction has come about apparently by the fusion of the previously shortened third and second tarsal segments. In *Jamesa* we find conditions that demonstrate the transition to the unsegmented tarsus prevalent in the tribe. Some species of *Jamesa* have a two-segmented tarsus (fig. 158D, K) similar to that of the two foregoing genera; in others, the fore tarsus is not segmented (fig. 157E, F); finally there are forms in which the intersegmental limits, though still visible, are weak enough to be overlooked by a casual observer (fig. 158J). As mentioned above, the remaining metapterine genera possess an unsegmented fore tarsus which has a tendency to become curved and strongly sclerotized (fig. 3M). In most cases, the tarsus is almost bare above and at the sides, with the exception of the also otherwise aberrant *Taitaia*, in which distinct hairs and spinelike setae are found on the lateral surface (fig. 180J). The setae of the ventral surface of the fore tarsus are frequently modified and generally from deflected to adpressed. In certain genera they are knifelike and strongly sclerotized, similar to the knifelike setae of the under surface of the fore tibiae (fig. 3F). This character serves to segregate a certain number of genera otherwise difficult to separate from others by external characters alone.

The praetarsus of the forelegs of the Emesinae is of unusual interest. In the plesiomorphic *Collartida* (fig. 18J, O, T) the claws of the forelegs are simple in structure, of identical size, and the arolia are elongate, conditions corresponding to those found in the Saicinae and most other reduviids.

The simplicity in structure of the fore claws is maintained in the Leistarchini, but very frequently the claws are from slightly to conspicuously dissimilar in size (fig. 4C), or one claw may even completely disappear. Within the single genus *Ploiaria*, all conditions from two normal-sized to slightly or conspicuously dissimilar claws are found, as well as species in which only a single claw has been retained (figs. 45E, S; 48I; 49E; 54G). *Phryxobotrys* is unique in that its large claw (the other one is extremely reduced) is more than one-third as long as the tarsus (fig. 43G, J). In all leistarchines, the arolia are very short (fig. 4C).

In the remaining emesine tribes, the claws of the forelegs have been uniquely modified. Their basal portion has become enlarged; it is heavily sclerotized on the inner claw. This claw (fig. 4D) is strongly salient on its under side basally, and its under surface bears a low membranous lamella; a conspicuous incision is formed either between the apex of the basal protrusion and the base of the lamella or on the basal portion of the lamella itself. The outer claw (fig. 4E) is equally somewhat salient basally, but the projection is crowned by a series of toothlike projections, which form a comblike structure not unlike that found on the claws of many spiders. The number of teeth is generally about five, though fewer are sometimes found in groups in which the individuals are small, such as the Ploiariolini. Many more than five are found only in Emesini, such as in *Stenolemoides* fig. 94E) and *Myiophanes* (figs. 80G; 81U). In

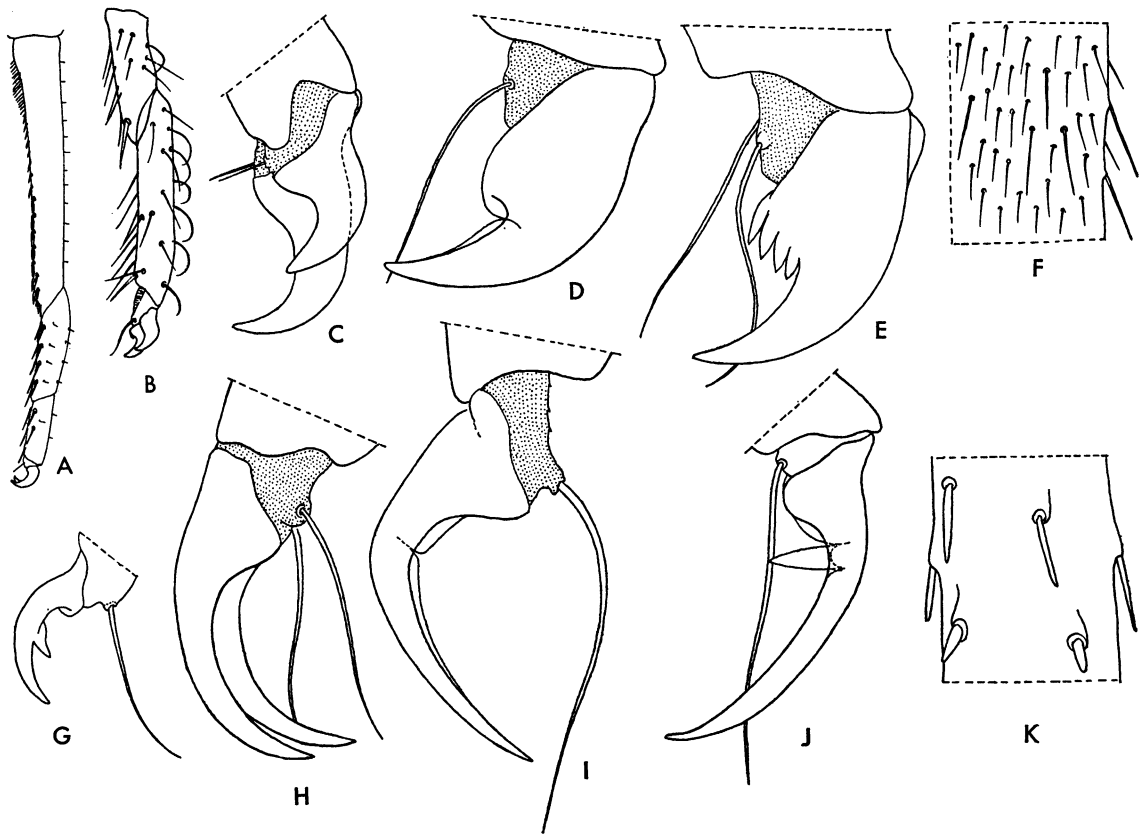


FIG. 4. A, B. Fore tarsus. A. *Ploiaria* sp. B. *Calphurnioides malkini*. C. *Ploiaria chilensis*, praetarsus and claws of foreleg. D, E. *Gardena pipara*. D. Praetarsus and inner claw. E. Praetarsus and outer claw. F. *Nesidiolestes roberti*, portion of posterior femur. G–J. Praetarsus and claws of hind leg. G. *Ploiaria* sp. (New Guinea). H. *Ploiaria chilensis*. I. *Dohrnemesa lanei*. J. *Emesa mourei*. K. *Ploiaria chilensis*, portion of posterior femur.

one of these genera (*Stenolemoides*, fig. 94G) as well as in some others (*Stenolemopsis*, fig. 97F), a few teeth may be found also on the inner claw. The general structure of the fore claws is rather similar in all the higher Emesinae, viz., the Emesini, Ploiarioliini, Deliastini, and Metapterini. No significant differences in the size of the two claws are found in the first two tribes, and the arolia are elongate (fig. 4D, E). In the last two tribes, the arolia are very short (fig. 129E), as in the Leistarchini, and a trend toward a reduction in size of one or both claws is accompanied by what I believe to be a secondary simplification of the structure of the under surface of the claws. There is never more than one tooth on the outer claw, but the incision of the under surface of the inner claw is distinct; in rare cases, for instance in some species of *Schidium* (fig. 176H), the claws seem to be completely inermous. A unique condition of the praetarsus is found in *Tubuataita*, in which the claw is completely fused with the tarsus (fig. 181C, I, J), a condition found even in late-instar nymphs; no first-instar nymphs are known.

The above-mentioned resemblance of the well-developed outer claw of the higher Emesinae to that of many spiders, and the unique structure of the inner claw, together with the well-established fact that the emesines that inhabit spider webs do not normally become entangled in the web and are sometimes even capable of "cutting" it (Gravely, 1915), suggest the hypothesis that the structure of the fore claws (and also that of the mid and hind

claws, as described below) is functionally related to the conquest by the bugs of a unique niche, the spider web.

The often considerable length and slenderness of the mid and hind legs of the Emesinae are among their most distinguishing characteristics, approximated or equaled within the Hemiptera perhaps only by some of the Gerridae. The extreme in relative length of the legs was found in the type specimen of *Mayemesa paraensis* (fig. 79C), a free-living species; it should be noted that, in another specimen of this species, less striking measurements were encountered. Possibly there is some correlation between relative leg length and the way of life of the respective bugs. The legs are especially elongate in genera that are frequently found in spider webs (*Emesa*, *Eugubinus*, *Emesaya*) and certain cavernicolous forms (*Lhostella*, *Bagauda*), but at least some of the relatively short-legged *Stenolemus* are equally arachnophilous.

The length of the mid and hind legs, especially that of the femora, as compared to other portions of the body, may furnish taxonomic evidence mainly on the specific level, though there is some individual variation. The structure of the mid and hind coxae, trochantera, femora, and tibiae is generally simple. In rare cases, such as in *Emesella* (fig. 144G), the apex of the femora and base of the tibiae show conspicuous nodosities reminiscent of those found in certain of the Harpactorinae.

The chaetotaxy of the femora and tibiae has proved to be of considerable value for classificatory purposes. The setae are in some cases of only one, but are frequently of two, different sizes: microchaetae and macrochaetae can be distinguished. Generally hairlike in the Collartidini, the Emesini, the Ploiariolini (fig. 4F), and many of the Leistarchini, the setae may become variously modified in others of the Leistarchini (fig. 4K), the Deliastini, and virtually all of the Metapterini, associated with similar modifications of the body setae. In addition to the microchaetae and macrochaetae, spines are occasionally found interspersed on the femora or tibiae in some of the Emesini, such as *Amilcaria* (fig. 64H), *Mayemesa* (fig.79J), and *Myiophanes* (fig. 81X). Another remarkable character is the presence of very numerous long hairs on the legs of some emesine genera, such as *Polauchenia* and especially *Stenolemus*, in which they are frequently arranged in conspicuous tufts, the color, number, and arrangement of which are characteristic for each species (figs. 98A, O; 100D; pl. 3, fig. 2). Similar though somewhat simpler tufts are found on the upper surface of the fore femora of some species of the ploiarioline *Ademula* (fig. 102M) and *Tridemula* (figs. 126T; 127C). The function of these tufts is not known, but it is obvious that they augment the body surface considerably in proportion to its volume or weight.

The tarsus of the mid and hind legs is short and normally three-segmented [two-segmented only in *Tinnatunga* (fig. 62F) and *Tinnunga* (fig. 63F)]. The relative size of the segments is variable; they are invariably movably articulated. Setae are present on all surfaces but are more numerous on the under side of the segments. In several cases, some bristles on the under side of the tarsi may become capitate and resemble in structure those composing the fossula spongiosa found on the tibiae of many reduviids. They may serve the same adhesive function that has been postulated for the fossula spongiosa. These setae are found in small numbers in some Ploiariolini, for instance, in certain species of *Ademula* (fig. 103K, L), *Empicoris* (fig. 115K), and *Tridemula* (fig. 127I). In one *Myiophanes* (fig. 82H), in several described and undescribed species of the leistarchine *Ploiaria* (figs. 49Z; 54V; 55I), and in the metapterine *Pelmatomesa* (figs. 167F, I), these modified setae become extremely numerous on the third tarsal segment, where they form a cushion-like structure, the scopula. It is not underlain by a region swollen by blood pressure, as in the tibial fossula spongiosa. Occasionally, the apex of the last tarsal segment has conspicuous spines on its under surface, best developed in *Eugubinus* (fig. 72I).

The praetarsus of the mid and hind legs invariably possesses long arolia. The claws of the mid and hind tarsi are simple in the Collartidini and the Leistarchini (fig. 4H). The only exception is found in some species of *Ploiaria*, in which their under surface bears a more or less conspicuous, pointed projection (fig. 4G). This modification is found in some

but not all of the species that possess a scopula (fig. 55H, I). In the remaining Emesinae, the under side of the claws normally has a low membranous lamella, divided by an incision into a shorter basal and longer apical portion (fig. 4I). In some cases, this lamella is secondarily reduced so as to be difficult to perceive, or disappears completely, especially in some Ploiariolini and Metapterini. In certain Ploiariolini, for instance, species of *Emesopsis* (fig. 110B) and *Malacopus*, one of the claws bears a small, pointed, subbasal tooth. Most of the Emesini conform to the basic pattern, but in *Chinemesa* the lamella becomes very large (fig. 67J, K), and in the decidedly arachnophilous genera *Emesa* (fig. 4J) and *Eugubinus* (fig. 72I) the claws have one or several conspicuous, pointed projections on the under surface, possibly useful in the animals' walking on the strands of spiders' silk. Normally developed in many metapterines (fig. 140I), the ventral lamellae are reduced in some others, and may even completely disappear, as in *Liaghinella* (fig. 162I). In others, the basal portion of the lamella becomes conspicuously enlarged, as in *Ghinallelia* (figs. 150H; 151G), *Ghilianella* (figs. 145H; 146H), *Jamesa* (fig. 157G), and *Emesaysa* (fig. 142J), and the cleft between the basal and apical portions becomes deeper. In *Pseudometapterus*, the claw possesses one or, rarely, two pointed processes at the level of the apical portion of the lamella, but independent of it (figs. 171E, M; 172F). Similar projections are found in *Onychomesa* (fig. 165J) and *Pelmatomesa* (fig. 167J).

It might be interesting to note that the mid and hind tarsus and praetarsus of the metapterine *Pelmatomesa* and some species of the leistarchine *Ploiaria* have a highly specialized but fully comparable structure, viz., a scopula on the under surface of the third tarsal segment and a spinelike projection on the under surface of the claws—a perfect case of homoiology (figs. 167F, J; 55H, I).

Forewing

The degree of the development of the forewings and hind wings of the Emesinae varies among different taxa and sometimes among specimens of one species. The forewings even of macropterous forms may vary in length, ranging from very elongate ones surpassing the abdominal apex (pl. 4, fig. 3) to very short ones not extending much beyond the middle of the abdomen, as in *Emesaya*, although the capacity for flight has not been lost here. In brachypterous specimens, the forewings and hind wings have become considerably shortened but generally still show the venation and color pattern of the macropterous morph (figs. 89A; 95A), and the thorax is normally developed, but flight has become impossible. In micropterous forms, the wings have been reduced to small pads or scalelike structures (figs. 19B; 101E; 123A, C; 165A; 171K), often difficult to discern, and the pronotum has in most cases become much modified, presumably in correlation with the reduction of the flight musculature. Apterous morpha lack any traces of wing pads (figs. 25A; 43E; 101F; 120A; 128E; 144A), and their thorax is modified as in micropterous forms. It is not always easy to distinguish micropterous from apterous morpha; therefore, the present paper may contain some inaccuracies in this respect. A discussion of the distribution of the various wing forms among the Emesinae is found under the heading Polymorphism. The following discussion refers only to the macropterous forewing.

An interpretation of the wing venation should ideally be based upon the study of the tracheation found in last-instar nymphs or teneral adults. No adequate material for such studies is available for the Emesinae. The identity of the veins as here established has been deduced by comparison with more generalized reduviid wings, such as the wing of *Triatoma infestans* (fig. 5A). This interpretation is very probably correct for the groups with plesiomorphic wing venation, such as the Collartidini and many of the Emesini, but is more in the nature of an educated guess for the more apomorphic venational types found in the Leistarchini, the Metapterini, and many of the Ploiariolini. Future research will in each case either prove or disprove the present interpretation. The nomenclature of the veins as used here follows that of Davis (1961); it differs in several respects from that of Villiers (1949a).

In the generalized reduviid forewing (fig. 5A) a distinct corium is separated from a large membrane by obliquely bent sections of M, Cu, and Pcu. In the corium, M frequently

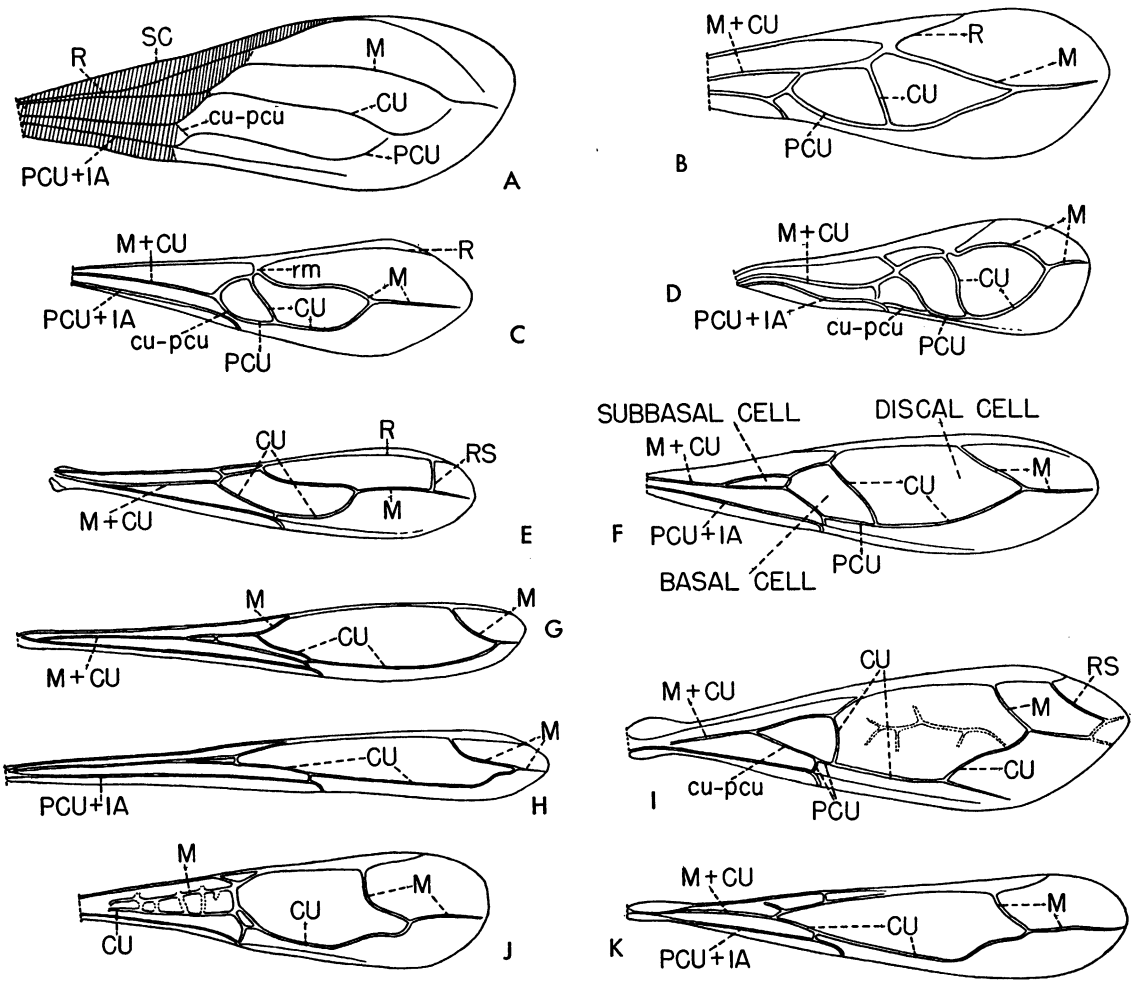


FIG. 5. Forewing. A. *Triatoma infestans* (Triatominae). B. *Carayonia* sp. (Saicinae). C. *Collartida* sp. (Emesinae). D. *Oncerotrachelus* sp. (Saicinae). E–K. Emesinae. E. *Orthunga wahlbergi*. F. *Armstrongocoris singularis*. G. *Palacus maculatus*. H. *Metapterus linearis*. I. *Stenolemoides arizonensis*. J. *Emesopsis nubilus*. K. *Empicoris vagabundus*.

approaches or joins R toward the base, and Cu remains independent. The apical portion of the corium formed by Sc and R falls considerably short of the level of the apex of the membranal cells. The latter, which more or less follow the longitudinal axis of the wing, are parallel to each other and not very dissimilar in size. They are limited by M and Cu and by Cu and Pcu.

In the Saicinae and the Emesinae, the structure of the forewing is uniformly membranous. In the basal portion of the wing, M is frequently fused with Cu; if it remains independent it does not join R, the latter being generally fused to Sc on its basal portion. The apical portion of the thickened anterior region formed by Sc+R, the pterostigma, is carried much farther toward the wing tip than in the generalized type. The membranal cells become very highly modified in the more apomorphic representatives of the Saicinae and the Emesinae (fig. 5E, G, H, J, K). In the plesiomorphic genera of both subfamilies, these cells are still rather similar to those of the generalized type (fig. 5B–D, F), though the cell formed by M and Cu tends to become conspicuously larger than the other cell, being, furthermore, situated apicad instead of laterad of the latter.

The venation pattern most similar to that

of the generalized type is found in the plesiomorphic saicines *Carayonia* (fig. 5B) and *Oncerotrachelus* (fig. 5D). Both show the above-mentioned shift of the membranal cells, but the pterostigma, though more advanced than in the generalized reduviid wing, does not yet attain the level of the apex of the distal cell. The portion of M limiting the apical cell is inserted basally on a short r-m cross vein.

The wing venation of the plesiomorphic emesines *Collartida* (fig. 5C) and *Stenorhamphus* is still much like that in *Carayonia* and *Oncerotrachelus*, but the elongation of the apical, or discal, cell becomes more pronounced, and the same is true of the pterostigma, which in these genera considerably surpasses the level of the apex of the discal cell. A similar tendency for an elongation of the discal cell and the pterostigma is also observable in the more specialized Saicinae, such as *Saica*, *Bagriella*, *Gallobelgicus*, and allies.

The two main types of wing venation found in the higher Emesinae, both with plesiomorphic and apomorphic features, can be derived from the conditions found in the Collartidini.

In the Leistarchini (fig. 5E), the portion of M limiting the discal cell is inserted on the r-m cross vein (a plesiomorphic condition), with one probably insignificant exception (*Mafulemesa*, fig. 37L). The discal is the only cell of the membrane (an apomorphic feature). It is limited anteriorly by M and posteriorly entirely by Cu. If this interpretation is correct, the transverse section of Cu that separates the discal and basal cell in *Collartida* is to be imagined as having shifted basad, absorbing Pcu and the vein connecting M+Cu and Pcu. The posterior basal angle of the discal cell is connected by a short r-m cross vein to Sc+R. A similar cross vein generally also connects the anterior basal angle of the cell to Sc+R, through it tends to become obsolete. In *Orthunga* and *Bagauda* there are species with and others without the latter cross vein; it seems always to be lacking in *Guithera* (*Guithera*), *Lhostella*, *Tinnunga*, *Mafulemesa*, and *Guithera* (*Proguithera*). Basad of the discal cell, M and Cu are invariably completely fused. A transverse Rs in the apical portion of the wing is almost invariably well developed.

The remaining tribes are characterized by a shift of the portion of M closing the discal cell apicad, M thus being inserted on Sc+R instead of the r-m cross vein (fig. 5E, G–K).

In many genera of the Emesini, both membranal cells are well developed (fig. 5F, I) and entirely comparable to those of *Collartida*. M and Cu frequently form a third narrowly triangular cell basad of the two others; in this case (fig. 5F), there are a subbasal cell, a basal cell, and a discal cell (*Phasmatocoris*, *Armstrongocoris*, *Stenolemopsis*, *Emesa*, *Mayemesa*). These three cells are placed one behind the other along the longitudinal axis of the wing; in *Emesa*, the portion of Cu separating the basal from the discal cell shows a tendency to shift basad, the basal cell being compressed laterally to a smaller or larger degree (fig. 71F, K, O–Q). In *Mayemesa*, a comparable shift has caused the quite small basal cell to be pushed against the anal border of the discal and to become completely separated from the subbasal cell (fig. 79B, M). In most of those genera that possess only two cells, part of the anal border of the basal cell is formed by Pcu in addition to the cu-pcu cross vein. The portion corresponding to Pcu is extensive in *Chinemesa* (fig. 67C) and *Stenolemus* (fig. 98H, J, R, T), becoming very short in *Dohrnemesa* (fig. 69A), *Polauchenia* (fig. 89P), and *Stenolemoides* (fig. 94C), or disappearing altogether in some species of the first two genera and in *Schoutedenocoris* (fig. 92C). This tendency for a reduction of the basal cell through a shifting basad of the perpendicular portion of Cu has attained its maximum expression in *Amilcaria* (fig. 64K), *Eugubinus* (fig. 72E), *Gardena* (fig. 73G), *Myiophanes* (fig. 81Q, V), and *Stenolemimus* (fig. 93L, T), in which the basal cell has disappeared completely; a subbasal cell is present in some cases. In *Stenolemimus* (fig. 93L, T) M+Cu is forked on its basal but not on its distal half, a condition unique for the subfamily. Cu frequently emits a short spur at the anal border of the discal cell (fig. 5I). In *Stenolemus*, *Stenolemopsis*, *Stenolemoides*, and *Myiophanes*, the discal cell shows frequently a somewhat irregular, percurrent, median, longitudinal, secondary vein (fig. 5I). In most genera, a distinct Rs is observed in the apical portion of the wing; it is frequently connected

to the distal branch of M by a somewhat evanescent cross vein.

In the Ploiariolini a reduced basal cell apparently has been maintained in *Emesopsis* (fig. 5J) and *Bironiola* (fig. 104C); it is lacking in all other genera. Basad of the discal cell, M and Cu are completely fused in *Ademula*, *Ctydinna*, *Empicoris* (fig. 5K), *Malacopus*, and *Panamia*. In the remaining genera, M and Cu are separate basad of the discal cell for some distance (fig. 5J). Both M and Cu attain the axillary region in one species of *Bironiola* (fig. 104C), but in a second species of the same genus (fig. 104S), as well as in *Calphurniella*, *Calphurnioides*, *Hybomatocoris*, *Mesosepis*, and *Sepimesos*, M is free-ending basally and does not attain the wing base. In *Tridemula* and most species of *Emesopsis* (fig. 108H, J, L, O), M and Cu meet at some distance from the base of the discal cell to form a narrow subbasal cell.

In the Deliastini, the three cells found in *Bergemesa* and *Palacus* (fig. 5G) are homologous with those of the Emesini as represented by *Armstrongocoris* (fig. 5F). From *Stalemesa*, the basal cell has apparently disappeared, the subbasal being followed immediately by the discal cell (fig. 132A). The deliastine forewing is remarkable on account of the great extension of the discal cell, the apex of which approaches the wing tip very closely (fig. 5G).

The same extension of the discal cell toward the wing tip is found in all the Metapterini (fig. 5H); the basal cell has disappeared. In *Emesaya*, M and Cu are independent basad of the discal cell, M being relatively short and free at its base, and Cu reaching the axillary region (fig. 142C). In the remaining genera in which winged forms are known (*Barce*, *Ghilianella*, *Jamesa*, *Metapterus*, *Onychomesa*, *Pseudometapterus*, and *Schidium*), M and Cu form a narrow, triangular, in some cases subdivided, subbasal cell basad of the discal cell (fig. 5H). A distinct Rs in the apical region of the wing has been found only in *Ghilianella* (fig. 145L).

The venation of the forewing is more varied in the Emesinae than in any other reduviid subfamily and furnishes excellent taxonomic characters on the generic and tribal levels. Study of it contributes toward the understanding of the phylogeny of the higher categories within the subfamily.

Hind Wing

The emesine hind wing possesses a wealth of characters useful on the tribal, generic, and specific level. It has been figured by various authors in taxonomic papers and has been briefly analyzed by Davis (1961), whose nomenclature is here followed (fig. 6E).

In the most plesiomorphic emesine, *Collartida* (fig. 6A), a free Sc cannot be found. The hamus is long and almost straight, approaching Sc+R only gradually; the m-cu cross vein is long and well developed, somewhat inclined. The cross vein formed by the apical portion of M connecting m-cu to R+M is large and obliquely inclined toward the wing tip. Both R+M and Cu are extended beyond the level of the cross vein; R+M approaches the wing margin, and Cu sends out a branch connecting it with R+M. The anal lobe is narrow and very short, less than half as long as the wing.

In some genera of the Leistarchini, a free Sc is present (*Nesita*, *Orthunga*). The hamus is long and almost straight, approaching Sc+R only gradually in such genera as *Armstrongocoris*, *Bagaudina*, *Leistarches*, *Mafulemesa*, *Nesita*, *Orthunga*, some *Ploiaria* (fig. 6C), *Tinna*, and *Tinnunga*. In others, the hamus angles abruptly toward Sc+R, though it remains generally individualized until it attains the axillary region, i.e., *Bagauda*, *Barrosia*, *Gomesius* (fig. 6B), and some *Ploiaria*. Cu is evanescent on its basal half in *Mafulemesa* (fig. 37M) and does not reach the axillary region. It is normally developed in the other genera examined (fig. 6B, C). The m-cu cross vein is short and perpendicular to the longitudinal axis of the wing in *Bagauda*, *Bagaudina*, *Gomesius* (fig. 6B), *Lhostella*, *Mafulemesa*, *Pseudobagauda*, and *Tinna*. It is long and obliquely directed basad in *Guithera* (fig. 32I). The cross vein is medium sized or large, as well as curved, in *Armstrongula*, *Barrosia*, *Phryxobotrys*, *Nesita*, *Orthunga*, *Ploiaria* (fig. 6C), and *Tinnunga*. In these genera, as well as in *Bagaudina*, Cu does not extend beyond the cross vein (fig. 6C), or does so only very slightly, though there are species of *Ploiaria* (fig. 55K) in which the distal branch of Cu is quite long. In the remaining genera,

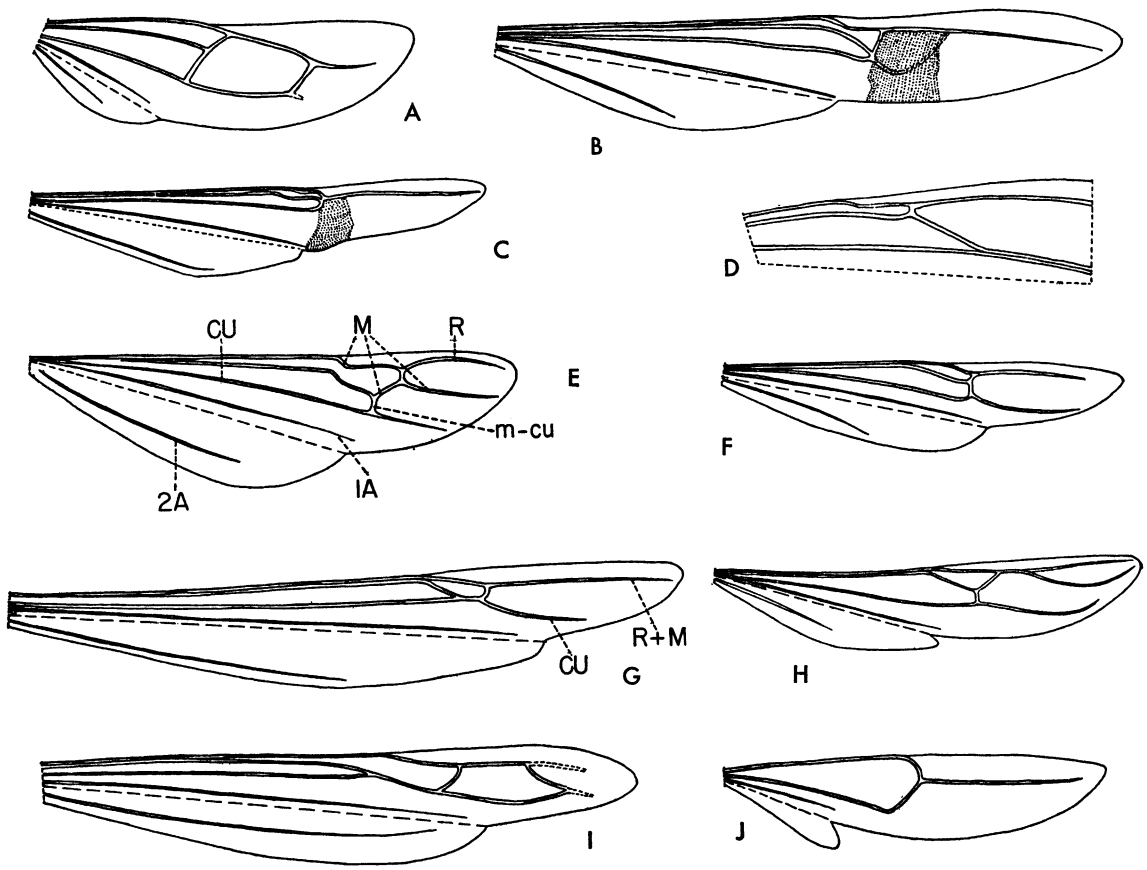


FIG. 6. Hind wing of the Emesinae. A. *Collartida* sp. B. *Gomesius bergrothi*. C. *Ploiaria circe*. D. *Emesa mouri* (central portion of wing only). E. *Stenolemus decarloi*. F. *Bergemesa brachmanni*. G. *Gardena* sp. H. *Empicoris rubromaculatus*. I. *Barce fraterna*. J. *Sepimesos alexanderi*.

Cu extends distinctly beyond the cross vein, downward in *Mafulemesa* (fig. 37M), backward in the others. In some cases, i.e., *Bagauda*, *Gomesius* (fig. 6B), and *Guithera*, Cu joins R+M subapically, forming a large cell. In *Mafulemesa* (fig. 37M) R and M are completely separate beyond the level of the cross veins. In all other genera they are fused to form a single vein (fig. 6B, C), generally well developed, but evanescent in *Orthunga motute* (fig. 41J). 1A and 2A are normally developed and lack special features (fig. 6B, C), but 1A is longer than usual in *Guithera* and joins the distal branch of Cu where the latter receives the r+m-cu cross vein (fig. 32I). The anal lobe is very short and narrow in *Tinnunga* (fig. 63I). In the remaining leistarchines, the anal lobe is well developed, wide, and as long as, or longer than, half of the length of the wing (fig. 6B, C). The anal lobe is lobate apically in *Mafulemesa* (fig. 37M) and in some *Tinna*, a feature found otherwise only in the Ploiariolini. Most of the Leistarchini examined, with the exception of *Tinna*, *Pseudobagauda*, and *Guithera*, show a conspicuous transverse thickening of the wing membrane behind the m-cu cross vein (fig. 6B, C), a feature unique in the Emesinae, reported formerly for *Ploiaria* by McAtee and Malloch (1925, 1926).

In the Emesini, a free Sc is often found: *Dohrnemesa*, *Mayemesa*, *Polauchenia*, *Schoutedenocoris*, *Stenolemoides brasiliensis*, *Stenolemopsis*, and *Stenolemus* (fig. 6E). The hamus is virtually straight and reaches the axillary region at some distance from Sc+R in *Mayemesa* (fig. 79I). It gradually approaches Sc+R in *Chinemesa*, *Dohrnemesa*, *Phasmatocoris*,

Polauchenia, *Stenolemoides*, *Stenolemopsis*, and *Stenolemus* (fig.6E) and angles sharply toward Sc+R in *Eugubinus*, *Gardena* (fig. 6G), *Myiophanes*, at least one species of *Phasmatocoris*, *Schoutedenocoris*, and *Stenolemimus*. In *Emesa*, the hamus approaches Sc+R very closely so as to become nearly indistinguishable in some cases (fig. 71L). The m-cu cross vein is short or medium sized and perpendicular to the longitudinal axis of the wing, and the section of M connecting m-cu to R+M is obliquely inclined toward the apex of the wing in most genera examined (fig. 6E). In *Chinemesa*, m-cu and the section of M mentioned form an almost straight line (fig. 66C). In *Emesa*, m-cu is very large and obliquely inclined toward the wing base, the mentioned section of M becoming extremely short (fig. 6D). The m-cu cross vein is absent from *Eugubinus* (fig. 72F), some species of *Myiophanes* (fig. 81N), and most *Gardena* (fig. 6G), M meeting Cu apicad of the level of the caesura and being fused to Cu at one point or for a short distance. Both R+M and Cu project considerably beyond the level of the cross vein. Both veins are simple in *Chinemesa*, *Dohrnemesa*, *Eugubinus*, *Emesa* (fig. 6D), *Gardena* (fig. 6G), *Mayemesa*, *Phasmatocoris*, and *Schoutedenocoris*. R+M is forked at some distance from the cross vein in *Myiophanes*, some *Phasmatocoris*, *Polauchenia*, *Stenolemoides*, *Stenolemopsis* (fig. 97I), and some *Stenolemus*, and the two veins are completely separated in *Stenolemimus* and some *Stenolemus* (fig. 6E). In *Stenolemopsis* (fig. 97I), some *Stenolemoides*, and some *Stenolemus*, the apical portion of Cu is connected to the distal branch of M, forming thus a large cell. There is nothing noteworthy about 1A and 2A. The anal lobe is about half as long as the wing in *Myiophanes*, *Stenolemopsis*, and some *Stenolemus* (fig. 99 O), and more than half as long as the wing in the remaining members of the Emesini (fig. 6E). *Dohrnemesa* and *Polauchenia* are characterized by an elongate sclerotized area accompanying the hind border of the anal lobe (fig. 69G).

In the Ploiariolini, a free Sc could be found only in *Bironiola bullata* (fig. 104E). The strongly reduced venation of *Bironiola* (fig. 104E), *Hybomatocoris* (fig. 116M), and *Sepimesos* (fig. 6J) does not contain a hamus. In the same genera, Sc+R and Cu are connected by a simple cross vein beyond which Cu extends in the first two genera but not the last. When present, the hamus angles rather sharply toward Sc+R (fig. 6H). The m-cu cross vein varies in length and is invariably perpendicular to the longitudinal axis of the wing (fig. 6H). The portion of M connecting m-cu to R+M is mostly obliquely inclined apicad (fig. 6H), though in some cases, i.e., *Empicoris winnemanna* (fig. 113U), m-cu and the section of M mentioned may form a continuous straight line. In the normally developed hind wing, both R+M and Cu project beyond the level of the cross vein, approaching the wing margin (fig. 6H), though Cu especially may fall considerably short of the wing border. Generally these veins are simple, but R+M is bifurcate in some cases, as in *Emesopsis nubilus* and *Empicoris rubromaculatus* (fig. 6H). Cu joins R+M subapically in *Malacopus* and *Calphurniella* (fig. 105F), forming a large cell. The anal lobe is about equal to, or longer than, half of the length of the wing (fig. 6H). In the strongly modified *Sepimesos* (fig. 6J) the anal lobe is much shorter than half of the length of the wing, and from the distinctly reduced hind wing of *Bironiola* (fig. 104E, R) and *Hybomatocoris* (fig. 116M), it is absent altogether. When present, the anal lobe is characterized by a small but distinct apical lobate projection (fig. 6H, J) found among the other emesines only in a few leistarchine genera (see above).

In the Deliastini, a free Sc is found in *Palacus*. The hamus is rather strongly angled toward Sc+R (fig. 6F) but is almost evanescent in *Palacus* (fig. 131D). The m-cu cross vein is obliquely directed toward the wing base in *Bergemesa* (fig. 6F) and *Stalemesa*, but in *Palacus* (fig. 131D) it is perpendicular to the longitudinal axis of the wing and forms a straight line with the section of M connecting m-cu to R+M. R+M and Cu project beyond the level of the cross vein attaining the wing margin (fig. 6F). In *Palacus*, the distal branch of Cu sends out, shortly beyond its point of origin, a basally directed spur (fig. 131D), which perhaps corresponds to the apical portion of 1A. The latter and 2A lack special features. The anal lobe is well developed and more than half as long as the wing (fig. 6F).

In the Metapterini, no free Sc is discernible. The hamus is very elongate and remains a considerable distance from Sc+R, approaching or even joining Cu subbasally in *Ghilianella* (fig. 145m) and *Jamesa*. It gradually approaches and then joins Sc+R in *Barce* (fig. 6I), *Metapterus*, *Onychomesa*, *Pseudometapterus*, and *Schidium*, with a tendency to become obsolete in many cases. Finally the hamus is sharply angled toward Sc+R in *Eugubinus* and *Emesaya* (fig. 142D). The m-cu cross vein has become suppressed completely (fig. 6I), and M meets Cu directly basad of the level of the caesura, being fused to Cu for a short distance in *Ghilianella* (fig. 145M) and for a considerable distance in all other genera. The section of M connecting Cu to R+M is more or less obliquely inclined apicad in all genera. In *Metapterus* and *Barce* it is somewhat curved (fig. 6I). Both R+M and Cu project considerably beyond the level of the mentioned section of M. In *Emesaya* (fig. 142D) these veins are simple. R+M is forked subbasally in *Ghilianella* (fig. 145M) and subapically in *Barce* (fig. 6I), *Jamesa*, *Metapterus*, *Onychomesa*, *Pseudometapterus*, and *Schidium*. In *Barce* and *Pseudometapterus*, Cu joins the apical branch of M to form a large cell (fig. 6I). Pcu is discernible in *Emesaya* (fig. 142D) but not in the other genera. 1A and 2A are present, though in some cases difficult to observe. The anal lobe is relatively wide and very long, two-thirds to three-fourths as long as the wing in most genera (fig. 6I). Only in *Ghilianella* does it not exceed half of the wing length (fig. 145M).

Abdomen

The basic structure of the emesine abdomen is identical with that of the remaining reduviids, viz., the first tergite is small, subtriangular or subsemicircular, bearing the first pair of spiracles (fig. 1A); the basal abdominal sternite is the second. The abdomen, rather broadly inserted on the thorax and rather short and stout in such plesiomorphic genera as *Collartida* (fig. 18A), mostly follows the general trend of lengthening and narrowing of the emesine body (figs. 102H; 133B; and others). Though its shape is usually fusiform, its basal portion may become conspicuously constricted, especially in some of the Ploiariolini (figs. 102H; 127V; pl. 3, fig. 5). The latter tribe is also characterized by a spine frequently present on the first tergite and 1+1 ectodermal invaginations situated posteriorly to a slight swelling of the same tergite (fig. 111J). The nature of these invaginations has not been studied.

The occasional presence of a median longitudinal ridge or keel on the sternites is a useful taxonomic character. The possible taxonomic usefulness of the exact arrangement of the spiracles, found invariably in seven pairs, has not been investigated. Those of the eighth sternite of the male are inserted in some cases on more or less conspicuous conical projections (figs. 158Q; 162P; and others).

Additional structural modifications can be observed in the fully exposed abdomen of the micropterous and apterous forms. Especially in the female sex, physogastry may occur (figs. 47T; 61G; 101A, E–G; 128E). The most astounding modifications of the abdominal shape are found in apterous species of the metapterine genera *Ghilianella* (figs. 146A, M, P; 147A, I, M) and *Ghinallelia* (fig. 150A), in which variously formed, often abrupt swellings of the abdomen lend the insects an often highly improbable aspect. These swellings may contribute toward blending the outlines of the body into the irregular background of the natural habitat of the insects among soil debris or on bark. A similar function may be served by the spines or tubercles along the midline of the abdominal tergites in several of the Leistarchini, i.e., *Orthunga* (fig. 42D, E), *Ploiaria*, *Tinna* (fig. 61A, D), *Nesidiolestes* (fig. 120A) of the Ploiariolini, and some of the Metapterini, i.e., *Emesella* (fig. 144B), *Ghinallelia* (fig. 151A), *Liaghinella* (fig. 162A), and others. The lobulate projections of the connexival segments of such species as the leistarchine *Gomesius lobatus* (fig. 30J) and the emesine *Dohrnemesa carvalhoi* (fig. 69A) and *Polauchenia marcapata* (fig. 89A) may assist equally in blending the abdominal outlines of the insect with the substrate on which it rests.

In most of the Emesinae, the basal abdominal sternite is fully sclerotized (fig. 7A), but in the Metapterini, its basal portion is membranous (fig. 7B), a condition enabling the abdomen of the male to bend sharply downward during copulation (pl. 4, fig. 1) and that of the female, during oviposition.

The pigmentation and chaetotaxy of the proctiger are peculiar to each taxon. A few illustrations (fig. 7C–G) of different genera and species prove this assertion. The subject has not been followed up in detail, but its mention serves to show that many sources of taxonomic characters still remain to be explored.

The Emesinae agree with the Saicinae in the absence of dorsal abdominal scent glands from the nymphal and adult stages. Most but not all other reduviid subfamilies have from one to three dorsal abdominal scent glands, with visible openings.

Male Genitalia

The male genitalia of most of the Emesinae do not differ in any significant way from those of other reduviids. The structure of the pygophore and parameres has been used by many authors for taxonomic purposes, but the phallus has not been given the necessary attention and has not been analyzed carefully as to its taxonomic significance. As shown in the following discussion and in the systematic part of this paper, the study of the phallus provides characters useful on the specific, generic, and often tribal levels. Its amazing diversity frequently surpasses that of the externally visible features of the bugs.

The genital region of the male in the Emesinae is generally covered from above by the elongate posterior portion of the seventh tergite (fig. 8A, B), but in the Leistarchini, the apterous males of the emesine *Eugubinus*, many of the Ploiariolini, and the deliastine genus *Stalemesa*, the seventh tergite is very short and leaves most of the genital region exposed (fig. 8C, D). The shape and sculpture of the projection of the seventh tergite are in some cases a specific and even a generic character. In those genera in which the seventh tergite is short, the eighth abdominal segment seems to form a complete ring (fig. 8C, D). In

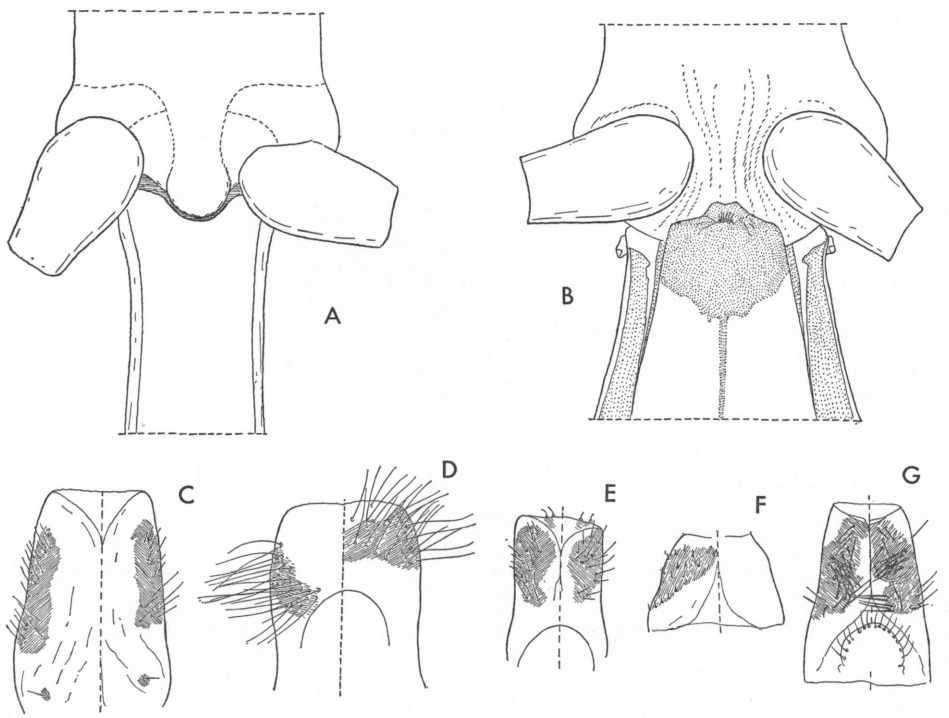


FIG. 7. A, B. Junction of metathorax and abdomen, seen from below. A. *Gardena* sp. B. *Barce fraterna*. C–G. Chaetotaxy and pigmentation of proctiger of male; at the left, posteroventral aspect; at the right, anterodorsal aspect. C. *Metapterus linearis*. D. *Barce fraterna banksii*. E. *Barce uhleri*. F. *Pseudometapterus butleri*. G. *Pseudometapterus rossi*.

the others, only the sternal portion of the eighth segment is distinctly sclerotized and partly exposed (fig. 8A). The shape of this exposed portion, in lateral and ventral views, and the position and structure of its spiracles are used in taxonomy, especially on the specific level.

The genital capsule, or pygophore, furnishes many valuable characters on the generic as well as on the specific level. It is generally necessary to illustrate its aspect in lateral view in order to show the kind and degree of curvature of its outline. The posterosuperior border of the pygophore has, in many instances, a process, the shape of which may vary considerably even within a genus, just as its aspect may not be the same in lateral and posterior views. Frequently spinelike, the process may be laterally compressed and truncate, rounded or emarginate apically, or be replaced by an emargination of the border of the pygophore, the sides of which may form 1+1 spines. The drawings accompanying the systematic part of this paper illustrate the considerable variation in the shape of the process mentioned. In some cases, as in various species of the ploiarioline *Ademula* (fig. 103N) and *Tridemula* (fig. 126B), and the metapterine *Jamesa* (fig. 157I), the process of the pygophore seems to arise from its inferoposterior border. The anterior dorsal sclerotization of the pygophore (fig. 8C) varies considerably in extension and may occupy most of the dorsal surface of the pygophore. The extension of the sclerotized portion frequently serves to characterize a given genus.

Parameres are never absent, although in some cases they are minute in relation to the size of the pygophore. They are mostly rodlike or slightly clavate and somewhat curved on their apical portion in the Collartidini (fig. 18N) and most of the Leistarchini, but in some of the latter, sickle- or S-shaped parameres are found (fig. 53J). A group of Pacific *Ploiaria* is unique in the subfamily in that the parameres are unusually large and transversely directed and overlap for part of their extension (figs. 52N; 53C). In the tribes mentioned, the parameres bear more or less numerous, simple, long or short setae. The parameres remain simple in most of the Emesini, but tend to be conspicuously broadened apically in *Phasmatocoris*, in which their distal half may assume a subrectangular or subtriangular shape (figs. 84I; 87M). They are very drastically modified in most New World species of *Gardena*, being very much reduced in size and inserted at a considerable distance from the apex of the pygophore (fig. 77D), and their distal portion may assume highly contorted shapes, some of which are illustrated in figure 77D, K, N, P, T. The structure of the parameres usually remains simple in the Ploiariolini, though less conventional forms can be found in occasional species of *Empicoris* (fig. 112I) and *Tridemula* (fig. 126E, N). Nothing unusual is found in the Deliastini and many of the Metapterini, but in some of the latter, modifications of structure or of chaetotaxy, or both, occur. In *Ghilianella* and *Ghinallelia*, the apical portion of the paramere is often clubbed or otherwise irregularly shaped, and short bristles tend to form clusters on this region (figs. 147E; 149H; 151N). In the *minimula* group of *Ghinallelia*, the parameres frequently have a pointed subapical projection which is unique in the Emesinae (fig. 149B). Some of the setae of the apical portion of the paramere are transformed into strongly sclerotized, short, cone-shaped spinulets, few or many in number, in *Ischnobaenella* (fig. 155P, S), *Leptinoschidium* (fig. 160G, AA), *Onychomesa* (fig. 166 O, R), and *Schidium* (figs. 174Q-S; 179U–W). The number and arrangement of these spinulets are of considerable taxonomic value, at least on the species level. In many species of *Leptinoschidium* and *Schidium* the paramere is triangularly widened on its apical portion, the shape of the widened portion being also useful for taxonomic purposes.

The following brief description of the phallus will introduce the terms used in the systematic part of this paper. Dupuis' (1955) nomenclature is generally followed.

The articulatory apparatus (fig. 8E, F), roughly stirrup-shaped in its basic form, is connected to the protractor muscles by the capitate processes (fig. 8F), which are generally subcircular and not subject to much variation. The dorsal connectives (fig. 8F) connect the capitate processes to the two basal plates, which together form the stapes (fig. 8F). The shape of the stapes is quite varied. The simple stirrup-shaped type, as in *Metapterus linearis* (fig. 163Y), is not very fre-

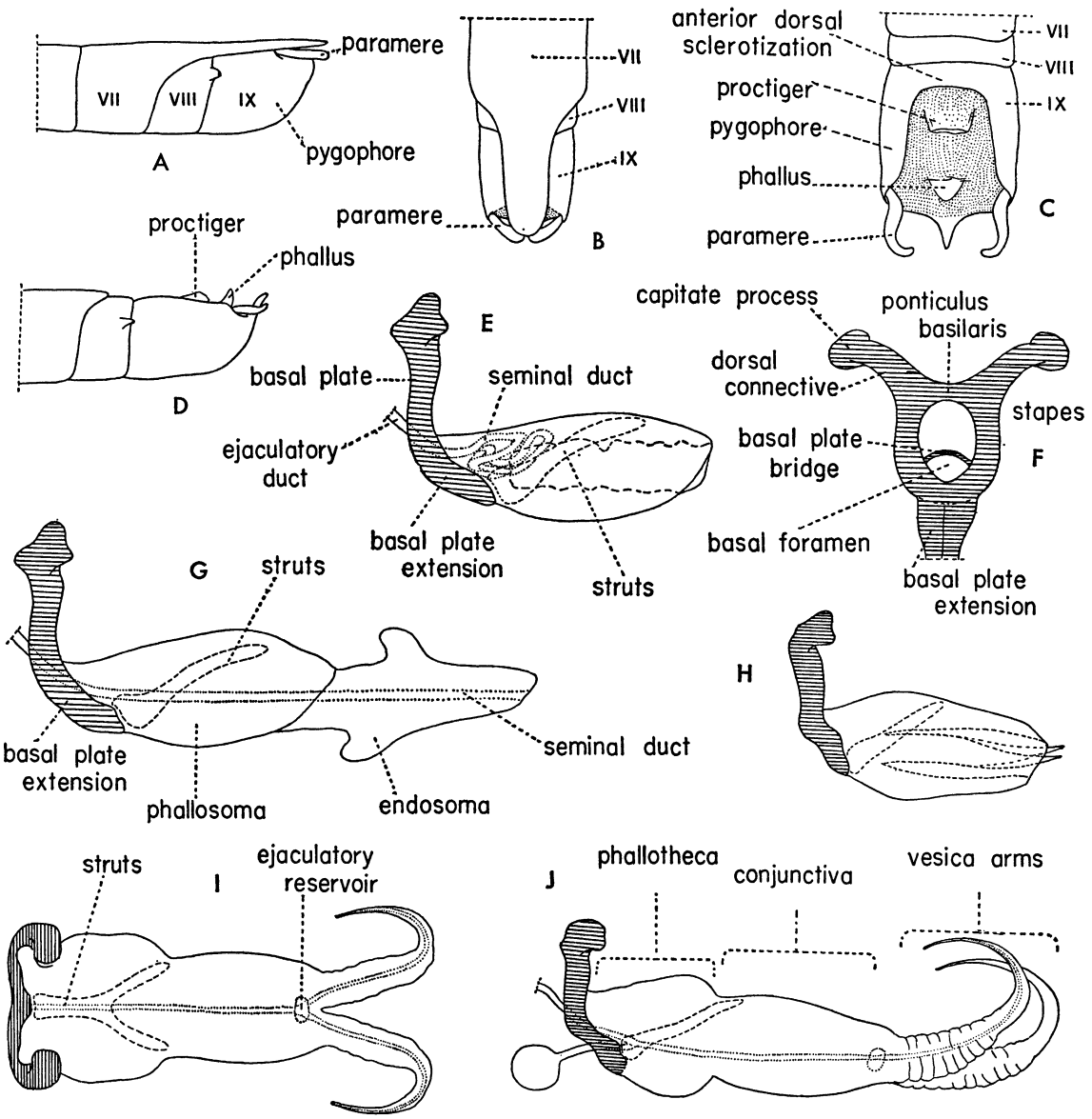


FIG. 8. Morphology and terminology of the male genitalia of the Emesinae. All figures are schematic and do not represent actual species. A. Lateral view of genital region, Emesini. B. Dorsal view of genital region, Emesini. C. Dorsal view of genital region, Leistarchini. D. Lateral view of genital region, Leistarchini. E. Lateral view of phallus, generalized type, endosoma invaginated. F. Articulatory apparatus. G. Lateral view of phallus, generalized type, endosoma everted. H. Lateral view of phallosoma of the Ploiariolini, endosoma invaginated. I. Dorsal view of ploiarioline phallus, endosoma everted. J. Lateral view of ploiarioline phallus, endosoma everted.

quently found in the Emesinae. The transverse dorsal connection of the basal plates, called the ponticulus basilaris (figs. 8F; 127T), may be interrupted (fig. 119N) or completely absent (figs. 63L; 66H), or the basal plates may be directly joined dorsally (fig. 73T) or entirely (fig. 106BB). There is much diversity in the structure of the basal plates, in some cases even within one genus, and considerably so within one tribe, but a more exhaustive study is needed for the value of the articulatory apparatus for distinction

of higher categories within the subfamily to be established definitely.

The ligamentary processes connecting the basal plates to the phallosoma, the basal plate extension (fig. 8E, F), are generally very short and inconspicuous and are not in every case clearly separated from the basal plates. The portion of the ligamentary processes situated within the phallosoma, the basal plate struts (also simply referred to as struts), may be separated or fused for some part of their extension (fig. 8G, I). The struts appear to be articulated to the basal plates.

The phallus proper is divided into a proximal portion, the phallosoma or phallotheca, and a distal part, the endosoma, telescoped within the former (fig. 8H) and evaginated (fig. 8G) during copulation. The surface structure of the phallosoma and endosoma and the number and nature of their processes furnish excellent taxonomic characters. The phallus is symmetrical in most of the Emesinae, but in certain genera of the Leistarchini, the Emesini, and the Metapterini, one or several portions of the phallus are more or less conspicuously asymmetrical (figs. 22T; 87P; 143C; 149C).

The ejaculatory duct carries the sexual products from the union of the vasa deferentia to the base of the phallus, which it enters through the basal foramen (fig. 8E, F). It runs through the phallus and becomes the seminal duct (fig. 8E, G) and ends at the secondary gonopore situated at the apex of the endosoma. When the latter is not everted, the seminal duct is coiled or folded within the body of the phallosoma.

The phallus undergoes certain modifications in the various groups, which are briefly summarized here. With the exception of that of the Ploiariolini, it belongs to the Type II of Dupuis (1963).

The phallus of *Collartida* (Collartidini) is simple in structure, with a short articulatory apparatus, a cylindrical, largely membranous phallosoma, and a short membranous endosoma beset with short sparse spiculae (fig. 18K, M).

The articulatory apparatus of the Leistarchini is generally (figs. 19P; 51N), but not invariably (fig. 63M), very short as compared with the phallosoma. The basal plate struts often seem to arise directly from the dorsal surface of the phallosoma and thus give no support to its anteroventral surface, which frequently causes the phallosoma, at least after treatment with potassium hydroxide, to swell out toward its base, and the articulatory apparatus consequently seems to be situated dorsad and somewhat caudad of the base of the phallosoma (figs. 43T; 44 O). The phallosoma itself is normally cylindrical in shape and does not bear conspicuous processes. The endosoma of most of the Leistarchini is beset with a generally large number of serially arranged spinelike or toothlike projections, which, when seen through the phallosoma walls, give it a somewhat accordion-like aspect (figs. 43T; 44 O). When the endosoma is everted, these projections become erected and probably function as a mechanism to retain the endosoma in the female genital organs during copulation. Figure 63L, M, shows a completely everted endosoma. Though the endosoma projections are normally disposed in regularly arranged rows, in some cases, notably in species of *Bagauda* (fig. 22Q, S, T) and especially *Ploiaria* (figs. 51N; 55Q; 57L, Q), they tend to form an asymmetrical pattern in distribution and size. The shape of the spinelike processes themselves may differ from one species to the other and provide specific characters. The male genitalia of some genera and many species of Leistarchini have not been examined, and the foregoing brief summary is not conclusive; the same applies to a certain extent to most of the remaining tribes.

The phallus of the Emesini is more varied in structure than that of the Leistarchini and not easily described summarily. The articulatory apparatus is relatively large and rather varied in structure. The struts seem to arise from the junction of the basal plates at the ventral surface of the phallosoma, rising obliquely toward the upper surface (fig. 73S, GG). The phallosoma is largely membranous, more or less cylindrical, and very simple in such genera as *Chinemesa* (fig. 66F, G), *Protogardena* (fig. 91K), *Stenolemus* (fig. 99M, Q), and others. Conspicuous, largely membranous phallosoma processes are found in *Armstrongocoris* (fig. 65R), *Dohrnemesa* (fig. 69M, N), *Emesa* (fig. 71V, X), *Stenolemoides* (fig. 95N, O), and *Stenolemopsis* (fig. 97 O, Q). Comparable but distinctly sclerotized pro-

cesses occur in some *Myiophanes* (fig. 81EE–GG). The endosoma seems to be simple and membranous in most genera. It is beset with a large number of tiny spiculae in *Eugubinus* (fig. 72BB, FF), thus resembling superficially that of the Leistarchini. A somewhat similar situation prevails in certain Old World *Gardena* (figs. 73GG; 74P), whereas in the *longimana* group of the New World the endosoma processes are larger, spinelike in shape, and somewhat irregularly arranged (fig. 76L–Q). In the highly specialized *pipara* group of *Gardena*, the ornamentation becomes very complex and highly specific (fig. 78A–E). *Phasmatocoris* is distinguished from all other genera by the considerably asymmetrical phallus. The asymmetry is often perceptible already in the phallosoma, especially in the shape of the basal plate struts and the overlying dorsal sclerotization of the phallosoma wall (fig. 86 O). The greatest degree of asymmetry, however, is found in the endosoma (shown in completely everted position in fig. 83I), especially on its apical portion (figs. 83R; 84L, R; 86P; 87P).

The phallus of the Ploiariolini (fig. 8I, J), though invariably symmetrical, has undergone unique modifications, which render it quite different from that of the usual reduviid type; it does not fit any of Dupuis' (1963) five categories. The generally rather strongly sclerotized phallosoma, here termed phallotheca, is preceded by a generally distinct though much shorter membranous section and followed by an endosoma differentiated into an evaginable conjunctiva and a vesica which is not evaginable though in some cases is inflatable. The vesica is unique in that it is double almost from its base, viz., the seminal duct is bifurcate apicad of a structure comparable to an ejaculatory reservoir at the limit between the conjunctiva and vesica, and each of the resulting branches of the seminal duct runs within a separate vesica arm. Another unique feature of the ploiarioline male genital organs is the presence, basad of the basal foramen, of a small, apparently ectodermal, bulblike structure connected to the seminal duct by a narrow duct of its own (figs. 8J; 109S; 112X; 114W). Possibly this structure is homologous with the vesicula described by Bonhag and Wick (1953) for *Oncopeltus*, in which it is part of an erection fluid pump. As has been mentioned elsewhere, the copulatory act of the ploiarioline emesines probably differs from that of the others in that no spermatophore is produced, and that the two vesica arms are introduced partly into the pseudospermathecal ducts discharging the sperm directly. The presence of a pumping mechanism not found in other emesines could well be connected with this difference in behavior.

The structure of the phallus of the ploiariolines, in addition to being complex, also varies and furnishes excellent taxonomical characters. The articulatory apparatus of the Ploiariolini is generally very short and stout in lateral view (figs. 112J; 124E). It is connected to the phallotheca by 1+1 sclerotized ligamentary processes, which are fused along their inner border basally before entering the phallotheca. The portion found within the phallotheca, the struts, may either maintain their individuality or become partly or completely fused to each other. They are more or less dorsally directed (fig. 124E, F). The phallotheca is subcylindrical or more or less swollen at its basal portion, and largely membranous; different zones of sclerotization furnish specific characters. The endosoma is not always easy to evert in preparations, and some of the illustrations show an invaginated or only partly evaginated endosoma. The conjunctiva is generally cylindrical; its surface may be smooth (figs. 106G; 117D) or somewhat corrugated (fig. 111R). Symmetrically arranged conjunctiva processes are present in several genera, such as *Emesopsis* (fig. 110G, M), *Empicoris* (fig. 113N), and possibly some others. The vesica arms take many shapes. From being relatively short, subcylindrical, and pointed apically (figs. 108Q; 111R; 117D), they may become extremely elongate, bandlike, or whiplike (figs. 103W; 113P; 121E). Vesica processes have been found in *Calphurnioides* (fig. 106G) and *Emesopsis* (figs. 109Q; 110M). The often very complex phalli in such genera as *Emesopsis* and *Empicoris* and their great difference from one species to another are in marked contrast to the relative uniformity of the external appearance of the respective species.

The male genitalia of all three known deliastine genera have been examined. The articulatory apparatus is of medium size and lacks

striking features. The phallosoma is mainly membranous and subcylindrical. The endosoma, roughly cylindrical, has a few lobular projections in *Palacus* (fig. 131K, M). In all three genera it is reminiscent of the leistarchine endosoma in that it has numerous longitudinally arranged setae or spinelike processes which become erect when the endosoma is everted (figs. 129Q; 131K). Asymmetry has not been encountered.

The articulatory apparatus of the Metapterini varies in size and structure; the illustrations show its value for distinguishing certain species. The basal plate struts are not always distinguishable in this tribe. When distinct, they may reach the dorsal phallosoma wall (figs. 143I, J, P; 148A, K) or not (fig. 139 O). The phallosoma is generally subcylindrical and in many cases strongly sclerotized on part or all of its surface. The degree of sclerotization and its localization are generic characters. In some cases, the phallosoma is entirely membranous, and in such a case is generally swollen, viz., in *Emesella* (fig. 144M), some species of *Ghilianella* (figs. 146Q; 148A) and *Ghinallelia* (fig. 151E), in *Hornylia* (fig. 152L), and in *Liaghinella* (fig. 162K). Paired membranous or sclerotized ventral phallosoma processes are found in many species of the nearly related *Leptinoschidium* and *Schidium* (figs. 160CC; 161K; 175L; 177P; 178I; 179N). In *Emesella* there are posterodorsal phallosoma processes (fig. 144M, Q) seemingly articulated movably to the phallosoma. The position of the phallosoma mouth, viz., the place where the everting endosoma emerges, may be apical (figs. 134M; 151H; 163U) or ventral somewhat basad of the distal end of the phallosoma (figs. 170V; 173R). In the everted condition, the endosoma is simply cylindrical and without sclerotized portions in certain species of *Ischnobaenella* (fig. 155R), *Jamesa* (fig. 157L), or *Pseudometapterus* (fig. 171HH). The presence of diversely shaped endosoma processes is frequent, such as in some species of *Berlandiana* (fig. 140S), *Onychomesa* (fig. 165P), *Pseudobargylia* (fig. 168I, HH), *Pseudometapterus* (fig. 172K, AA), and others. The endosma may become very complex in *Leptinoschidium* and *Schidium* (figs. 161K, Q, R; 176Q; S; 178Q) through the acquisition of symmetrical sclerotized appendages of complex shape. Equally complex, though different, endosoma processes are found in *Ghilianella*, in which they are highly specific (figs. 146 O; 147D, L; 148A, K, R). The endosoma has become asymmetrical in *Emesaya* (fig. 143C) and in *Ghinallelia* (figs. 149C, G; 150M; 151K), with an astounding variety of irregularly arranged sclerotized processes, especially in *Ghinallelia*. The great complexity and diversity of the genital appendages of the males and also the females of *Ghinallelia* are contrasted by a remarkable uniformity of other external characters, which taken alone would make it exceedingly difficult to differentiate many of the species of this genus.

Female Genitalia

The external female genitalia of the Emesinae, like those of other reduviids, are composed of the gonocoxites of segment VIII (called simply "gonocoxites" in the present paper), the anterior and posterior gonapophyses (corresponding to abdominal segments VIII and IX), and the styloids, or third gonapophyses. The sclerites mentioned are invariably present, but the degree of their development and their shape vary considerably from one taxon to another.

The general aspect of the genital region is determined mainly by the eighth and ninth tergites and, to a lesser degree, by the gonocoxites. The tergites are poorly sclerotized in many of the Leistarchini and most of the Emesini and the Ploiarioliini, and are frequently distorted in dried specimens. In many of the Leistarchini and in the Deliastini and the Metapterini, the tergites are strongly sclerotized and permit their detailed observation in dried specimens. In these latter tribes, the shape of the last tergites is frequently complex and furnishes valuable taxonomic characters on the generic and specific levels. The eighth and ninth tergites generally form a continuous surface which is subhorizontal (fig. 140X) or more or less inclined posteriorly, being almost vertical in some cases (fig. 9A), but in others, both tergites form a distinct angle (fig. 128A). In several of the Metapterini, the eighth tergite covers a great part of the ninth from above, as in *Jamesa* (fig. 158Y), *Schidium* (fig. 179DD), and *Tubuataita* (fig. 181R), or completely, i.e., *Anandromesa* (fig. 133N), *Barce*

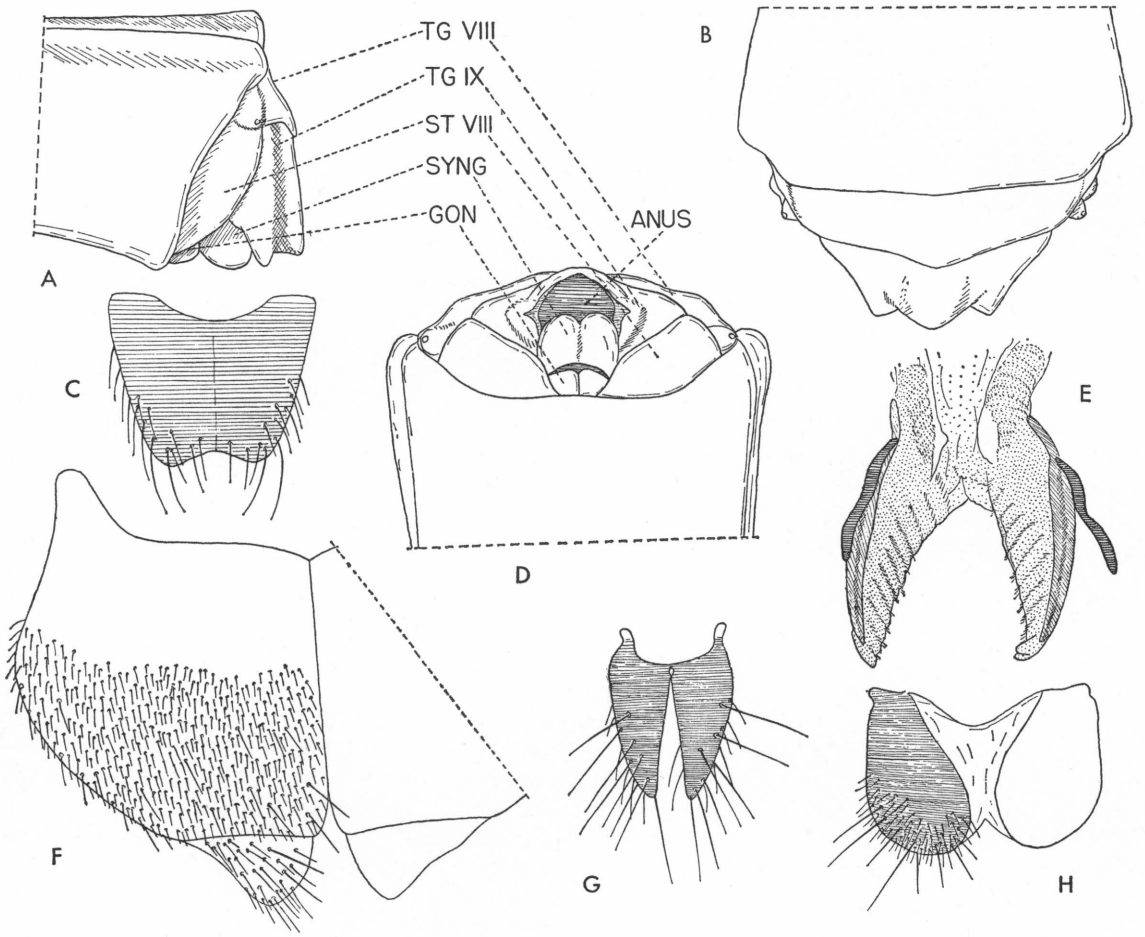


FIG. 9. Morphology and terminology of the female genitalia. A, B. *Gomesius hesione* (Emesinae). A. Genital region, lateral view. B. Apex of abdomen, dorsal view. C. *Gardena* sp. (*melinarthrum* group), syngonapophysis. D. *Gomesius hesione* (Emesinae), genital region, ventral aspect. E, F. *Gardena* sp. (*melinarthrum* group). E. Posterior gonapophyses. F. Gonocoxite and gonapophysis. G. *Paratagilis spinosus* (Saicinae), third gonapophysis. H. *Oncerotrachelus pallidus* (Saicinae), third gonapophysis.

Symbols: GON, gonapophysis; ST VIII, gonocoxite; SYNG, syngonapophysis; TG VIII, eighth tergite; TG IX, ninth tergite.

(figs. 134U; 136T), *Pseudometapterus* (fig. 171W), and others. In all other tribes, the ninth tergite is free. The relative sizes of the last tergites vary considerably: the ninth may be as large as, smaller than, or larger than, the eighth. The tergites are basically semicircular in shape, but they may also be quadrangular, trapezoidal, or more or less incised or salient apically. Their surface is most frequently smooth, but in some genera, i.e., *Ghilianella* and allies, a more or less complex surface sculpture (figs. 150 O, P; 151I), consisting of carinae, ridges, sulci, and various other depressions, furnishes good taxonomic characters. The greatest variety in shape and surface structure is found in the Deliastini and the Metapterini. In *Gardena*, there is, posterior to the ninth tergite, a sclerite, here interpreted as a small but well-developed tenth tergite (fig. 77F, J, L), unique in the subfamily.

The gonocoxites of the eighth segment are covered at the base by the seventh sternite; the covered portions lack setae which are abundant on the free section (fig. 9F). The gonocoxites are separate but connected by a

delicate membrane; rarely, i.e., in the leistarchine *Armstrongula* (fig. 19V) and the metapterine *Ischnobaena* (fig. 153T) and *Nandariva* (fig. 164N), the gonocoxites are fused along the midline. The posterior margin of the gonocoxites is generally broadly rounded; in some cases, i.e., in some species of the metapterine *Pseudobargylia* (figs. 169AA; 170M, R), they have more or less pronounced posterior projections.

The anterior gonapophyses (called simply "gonapophyses" in this paper) are situated on the posterior border of the gonocoxites close to each other (fig. 9F), in some cases are connected by a membrane, and in *Tubuataita* (fig. 181S) are fused to each other completely. The gonapophyses are small, subsemicircular to subtriangular in shape, and covered with setae generally longer than those of the gonocoxites.

The posterior gonapophyses are membranous and fan-shaped (figs. 9E, 64M; and others); those of the saicine genera *Oncerotrachelus*, *Paratagalis*, and *Saica* are of the same type. There are minor differences between the posterior gonapophyses of different taxa in the Emesinae, but no taxonomic use has here been made of these structures.

The paired styloids or third gonapophyses of the Saicinae, as in most reduviids, are well individualized and meet only at the base, e.g., *Paratagalis* (fig. 9G); rarely are they connected by a delicate membrane, as in *Oncerotrachelus* (fig. 9H). In the Emesinae, the third gonapophyses maintain a separation in the plesiomorphic *Collartida* (fig. 18R) and the leistarchine genus *Armstrongula* (fig. 19W). In all other genera examined for this character, the third gonapophyses become fused and form a single sclerite (fig. 9C), termed "syngonapophysis" in the present paper. A similar fusion of the third gonapophyses has arisen independently in other reduviid subfamilies, viz., the Harpactorinae and the Apiomerinae (Wygodzinsky, 1946b, 1947d).

The syngonapophysis is well developed in the Leistarchini (except in *Armstrongula*), the Emesini, the Deliastini, and the Metapterini. It consists of a trapezoidal or subsemicircular sclerite which is frequently emarginated or incised apically (fig. 9C, D). Its shape, degree and extension of pigmentation, and its chaetotaxy furnish valuable taxonomic characters on the specific and generic levels. The syngonapophysis is remarkably developed and very conspicuous *in situ* in many of the Metapterini and Leistarchini; in the latter, it is generally deeply incised, hinting at its origin from a double structure (figs. 21U; 38W; and others). The syngonapophysis is much smaller in others of the Leistarchini and in the Emesini and the Deliastini. In the Ploiariolini, it is considerably reduced, consisting of a transverse, semicircular to subtriangular, not, or only weakly, pigmented membranous band, with or without setae (figs. 111CC; 115S; 117G; 121L; 122T; 124M).

POLYMORPHISM

Pterygopolymorphism

Although the macropterous condition is the usual one in the Reduviidae, some brachypterous, micropterous, and apterous forms are known to occur in most subfamilies. The proportion of such forms, very low in other subfamilies, is exceptionally high in the Emesinae: in 43, or more than 50 per cent, of the genera listed, micropterous or apterous forms are known; they may still occur in others. In six additional genera, brachypterous forms occur in addition to the fully winged ones.

The classical concept of pterygopolymorphism refers to the phenomenon on the specific level. For the purpose of the present discussion, its application is extended here to the generic and the tribal levels.

On the specific level, both sexes may be fully winged (most of the Ploiariolini and many others) or homodimorphic, either micropterous (the species of the ploiarioline *Saicella*) or apterous (the species of the ploiarioline *Nesidiolestes*, many of the Metapterini, and others). In other cases, heterodimorphism may obtain, with the male fully winged and the female either brachypterous (the emesine *Stenolemoides arizonensis*), micropterous (the leistarchine *Armstrongula*), or apterous (the leistarchines *Bagaudina* and *Bettyella*, the emesines *Chinemesa* and *Myiophanes kerzhneri*, the metapterine *Schidium malkini*, and others). In some cases one sex, generally the male, is dimorphic, such as in the deliastine *Bergemesa brachmanni*, in which all females are apterous but in which both fully winged and apterous males occur sympatrically. Still another condition is exemplified by *Schidium marcidum*, in which females as well as males are either winged or apterous, but this condition is geographically correlated, the apterous populations occupying the northern, and the winged ones the southern, portion of the total area of the species, which extends from China and Japan to Australia.

On the generic level, all species within one genus may belong to the same morph, for instance, all may be macropterous, as in most of the Ploiariolini and many leistarchine and emesine genera, or all micropterous or apterous, as in the ploiariolines *Nesidiolestes* and *Saicella*, and many metapterine genera, or all species may be heterodimorphic, with winged males and micropterous or apterous females, for instance, the leistarchine genera *Armstrongula*, *Bettyella*, and *Phryxobotrys*. Genera containing only fully winged and homodimorphic species, to the exclusion of heterodimorphic ones, are exceedingly rare; the metapterine *Jamesa* is a possible example. On the other hand, genera with fully winged, homodimorphic, and heterodimorphic species are well known, i.e., the leistarchine *Ploiaria* and the metapterine *Pseudometapterus* and *Schidium*. We do not know any genus in which all species have one sex that is dimorphic and the other one not, or in which both sexes are dimorphic in all species.

On the tribal level, polymorphism is universal, viz., all tribes contain genera and species with and without pterygopolymorphism. Alary polymorphism can thus be considered as a general characteristic of the Emesinae. Interestingly enough, micropterous and apterous forms are unknown in the closely related Saicinae.

Table 3 is a summary of our knowledge of the occurrence of fully winged, brachypterous, micropterous, and apterous forms in the Emesinae on the generic level, and for each sex. The table does not reflect the fact that not all species of a given genus necessarily show the same type of wing development, and also suffers from being based partially on negative evidence regarding certain lesser known genera described from a single species or only one sex.

The frequency of genera containing micropterous and apterous forms is not the same in all tribes. The total number of genera composing the Collartidini (two) and the Deliastini (three) is too few to allow a meaningful discussion of the alary development of their components. It must suffice to stress the fact that the loss of wings is a trend already apparent in the most plesiomorphic Emesinae, the Collartidini.

One-half of the 22 leistarchine genera contain micropterous or apterous morpha, but in only two of these 11 genera are macropterous

TABLE 3

OCCURRENCE OF DIFFERENT WING FORMS IN THE EMESINAE

	Macropterous	Brachypterous	Micropterous or Apterous
Collartidini			
Collartida	♂ ♀	—	♀
Stenorhamphus	♀	—	—
Leistarchini			
Armstrongula	♂	—	♀
Atisne	—	—	♂
Bagauda	♂ ♀	—	—
Bagaudella	♂	—	—
Bagaudina	♂	—	♀
Barrosia	♂ ♀	—	♂ ♀
Bettyella	♂	—	♀
Gnomocoris	♀	—	—
Gomesius	♂ ♀	—	—
Guithera	♂ ♀	—	—
Lethierrya	Sex not known	—	—
Lhostella	♂ ♀	—	—
Mafulemesa	♂ ♀	—	—
Millotina	—	—	♀
Nesita	♂	—	♂ ♀
Orthunga	♂	—	♂ ♀
Phryxobotrys	♂	—	♀
Ploiaria	♂ ♀	♂ ♀	♂ ♀
Pseudobagauda	♂ ♀	—	—
Tinna	♂	—	♂ ♀
Tinnatunga	♂	—	—
Tinnunga	♂	—	—
Emesini			
Amilcaria	♀	—	—
Armstrongocoris	♂	—	—
Chinemesa	♂	—	♀
Dohrnemesa	♂ ♀	♀	—
Emesa	♂ ♀	♀	—
Eugubinus	♂ ♀	—	♂
Gardena	♂ ♀	♂ ♀	♂ ♀
Mayemesa	♀	—	—
Myiophanes	♂ ♀	—	♀
Phasmatocoris	♂ ♀	♀	—
Polauchenia	♂ ♀	♀	—
Protogardena	♂ ♀	—	—
Schoutedenocoris	♂ ♀	—	—
Stenolemimus	♂	—	—
Stenolemoides	♂	♀	—
Stenolemopsis	♂	—	—
Stenolemus	♂ ♀	—	—
Ploiariolini			
Ademula	♂ ♀	—	—
Bironiola	♂ ♀	—	—
Calphurnioides	♂ ♀	—	—
Calphurniella	♂ ♀	—	—
Clydinna	♀	—	—
Empicoris	♂ ♀	—	—
Emesopsis	♂ ♀	—	—
Hybomatocoris	♂ ♀	—	—
Malacopus	♂ ♀	—	—
Mesosepis	♂ ♀	—	—
Nesidiolestes	—	—	♂ ♀
Panamia	♂ ♀	—	—
Saicella	—	—	♂ ♀
Sepimesos	♂	—	—
Tridemula	♂ ♀	—	—
Deliastini			
Bergemesa	♂	—	♂ ♀
Palacus	♂ ♀	—	—
Stalemesa	♂	—	—
Metapterini			
Anandromesa	—	—	♀
Barce	♂ ♀	—	♂ ♀
Bargylia	—	—	♂ ♀
Bobba	—	—	♂ ♀
Emesaya	♂ ♀	—	—
Emesella	—	—	♂ ♀
Ghilianella	♀	—	♂ ♀
Ghinallelia	—	—	♂ ♀
Hornylia	—	—	♂
Ischnobaena	—	—	♂ ♀
Ischnobaenella	—	—	♂ ♀
Ischnonyctes	—	—	♂ ♀
Jamesa	♂ ♀	—	♂ ♀
Leaylia	—	—	♂ ♀
Leptinoschidium	—	—	♂ ♀
Liaghinella	—	—	♂
Metapterus	♂ ♀	—	♂ ♀
Nandariva	—	—	♀
Onychomesa	♂	—	♂ ♀
Pelmatomesa	—	—	♂ ♀
Pseudobargylia	—	—	♂ ♀
Pseudometapterus	♂ ♀	—	♂ ♀
Schidium	♂ ♀	—	♂ ♀
Taitaia	—	—	♂
Tubuataita	—	—	♂ ♀

forms lacking completely. Both genera are insular (*Atisne* from Lord Howe Island, *Millotina* from Madagascar).

Among the 17 genera of the Emesini, all of which have macropterous species, four also possess species that are entirely or partially micropterous or apterous. Brachypterous forms are found in species of six genera, one of which is among the four mentioned above. Most species with micropterous or apterous forms occur in continental or oceanic islands, e.g., *Chinemesa* on Borneo, *Eugubinus* on New Caledonia, *Gardena* on islands of the Pacific, and *Myiophanes* on Madagascar. The species of *Chinemesa* and *Myiophanes* have lost their wings in the female sex only, and in *Gardena* wingless species occur also in continental species. On the other hand, micropterous and apterous females enumerated in this paper under Emesini *incertae sedis*, as well as others before me but not further mentioned, are also definitely continental.

Micropterous or apterous forms are very rare in the Ploiariolini; they occur, to the exclusion of winged forms, in only two genera (*Nesidiolestes* and *Saicella*), both inhabiting the Hawaiian Islands and containing only a few species each.

The highest proportion of genera with micropterous and apterous forms is found in the Metapterini, viz., 24 of the 25 genera listed. Seventeen genera lack macropterous morpha completely. Seven of them are restricted to islands, and seven others have insular species in addition to continental ones.

The question as to the significance of the widespread phenomenon of alary polymorphism in the Emesinae cannot yet be answered. Southwood (1961) has summarized research on hormonal influence on the phenotypical wing development in the Heteroptera. Seasonally or geographically variable environmental factors, such as temperature, determine in each case through the action of hormones the morph of the phenotypically plastic individual. It is imaginable that such factors may occasionally have become stabilized in regard to given populations and eventually produced, during the course of evolution, genetically fixed changes phenotypically similar to those above. Unfortunately, we do not know in a single case of polymorphism in an emesine whether it is determined genotypically or phenotypically. The latter possibility cannot be excluded in those instances in which one or both sexes are dimorphic, such as in *Barce fraterna* in North America.

The special frequency of micropterous and apterous forms in insular Emesinae could be explained by the speeding up of the evolutionary process among initially very small populations. Though it could be adduced that the loss of wings in insular populations is an adaptive response to meteorological factors, such as wind, the same would not necessarily apply to Emesinae found in continental areas, where the loss of wings is equally very frequent. Semiarid and arid conditions seem to favor a reduction or loss of the wings. The phenomenon is very frequent in the Metapterini, many of which prefer such habitats, and in some of the Deliastini and many of the Leistarchini of similar preferences, but exceedingly rare in the Ploiariolini, which shun aridity, and only moderately common in the Emesini, which are somewhat intermediate ecologically. On the other hand, high humidity combined with relatively low temperature, such as is found in heavily forested or certain mountainous areas, also seems to be correlated with the reduction or loss of wings in the Emesinae. Some of the situations mentioned could be considered as representing actual or past ecological islands, which would make it possible to apply the hypothesis of accelerated evolution in small populations.

The subject of alary polymorphism on the various levels in the Emesinae deserves a more detailed analysis. It is hoped that the present systematic revision will provide one of the bases for such work.

Sexual Dimorphism

Sexual dimorphism in the Emesinae ranges from slight differences in body proportions to extreme cases of alary polymorphism, as described in the preceding section, with concomitant changes in the thoracic morphology.

A universal difference between the sexes of the emesines is the width of the abdomen, this difference being generally slight in fully winged forms but in some cases very conspicuous if the female is brachypterous, micropterous, or apterous. The female abdomen becomes frequently physogastrous (figs. 95A;

128E). In some species of *Ghilianella* and *Ghinallelia* in which the abdomen is swollen in both sexes, its exact shape may differ considerably between male and female (figs. 150A, B).

Additional sexual differences may be found in the head and its appendages. In many species, the eyes of the female are smaller than those of the male. This difference applies not only to species with pronounced pterygopolymorphism (figs. 19A, B, E, F; 94A; 95L; 128A, D) but also to some in which both sexes have fully developed wings, especially among the Leistarchini (fig. 29C, D). The only exception is *Collartida oculata*, in which the eyes of the male (fig. 18E, F) are smaller than those of the female (fig. 18B, C); both sexes are macropterous.

Another secondary sexual difference is found in the antennae. The first and second segments of the male antennae may bear numerous long ciliate hairs (figs. 43A; 57B; 94C; and others). Such hairs are only very rarely encountered in the female (fig. 92B).

Sexual dimorphism may cause difficulties in associating the two sexes of a species, especially if two or more species of a given genus are sympatric. It is probable that the males and females of some emesine species have been described under two different names, and that in others the sexes have been associated incorrectly under one name. Because of the often large over-all differences between males and females, and also because the morphology of the external genitalia is frequently used as a key character to the exclusion of other features, I have found it necessary to subdivide many specific keys according to the sex of the specimens.

INTERNAL ANATOMY

Alimentary System

Miyamoto, in his recent paper (1961) on the comparative morphology of the alimentary system of the Heteroptera, described and figured the alimentary canal and salivary glands of *Empicoris brachystigma*, *Ischnonyctes marcidus* (as *Gardena marcida*), and *Gardena muscicapa*. The stomach of the Emesinae is relatively longer than that of the other reduviids, except for the saicine *Polytoxus*; its second portion is short and bladderlike in *Empicoris*, and long, tubelike, and S-shaped in *Schidium* and *Gardena*, and, as can now be added, also in *Myiophanes* (fig. 11A). The salivary gland is bilobed, with the posterior lobe slender and very elongate; the accessory gland has the shape of a long, narrow tube.

Male Reproductive System

The only published information on the internal anatomy of the male reproductive system of the Emesinae is that by Carayon (1950c), who mentioned that the accessory glands (mesadenia) are restricted to one "tube" on each side. Though this information is correct for some Emesinae, in others more than one "tube" is present in each accessory gland.

Work carried out in connection with the present study, though far from exhaustive, has brought to light certain additional information on the structure of the internal anatomy of the male reproductive system which has been found to possess a number of highly unusual features.

In all genera examined, the testes are situated at different levels, the left testis being anterior to the right one. In all others of the Reduviidae, including the related Saicinae (fig. 10A, B), both testes are situated at the same level. The obvious hypothesis that this shift of the testes is causally correlated with the tendency for a narrowing and elongation of the abdomen as observed in the Emesinae is strengthened by additional peculiarities in the shape and disposition of the testes, especially in the tribes Emesini, Metapterini and Ploiariolini. The basic number of the testicular lobes is seven, as usual for the reduviids, but in some cases (*Bobba*, and several of the Ploiariolini) a smaller number is found.

The vasa deferentia are of the usual reduviid type; their relative length, degree of spiraling, and the size, position, and shape of the seminal vesicle are quite different from one genus to the other. The vasa deferentia in one individual are generally of unequal length, in agreement with the different distances of the two testes from the copulatory organ.

The accessory glands possess two lobes in the plesiomorphic Leistarchini, and only one, though in some cases of complex shape, in the remaining groups. They are more or less asymmetrically placed, following the general arrangement of the genital organs.

The following analysis of the conditions found in the genera examined is deemed useful; it shows the surprising variety of arrangements of the organs in question, all of which seem to represent equally successful ways of solving the problems posed by the extreme narrowing of the abdomen as found in the Emesinae. These arrangements may also serve as excellent taxonomic characters, at least on the generic level. Specific differences seem to be negligible, at least in the genera examined. Not enough genera have been studied to enable us to affirm the existence of tribal characters in all cases.

In the four following genera of the Leistarchini, the testes are composed of seven follicles each; they are relatively compact and triangular in shape. The seminal vesicle is tubular, about one-third as long as the vas deferens, and situated approximately at its middle. The accessory glands possess two well-developed tubular lobes, one translucent ("transparent gland" of Gaillard), and one opaque ("opaque gland" of Gaillard); the latter shows a more or less developed, fingerlike appendix below the insertion of the vas efferens. In most cases, the glands are parallel; in one case, the glands are divergent, the large transparent gland occupying the space usually taken up by the basal projection of the opaque gland, which is lacking.

Ploiaria mosconai (fig. 10C–E): Testes

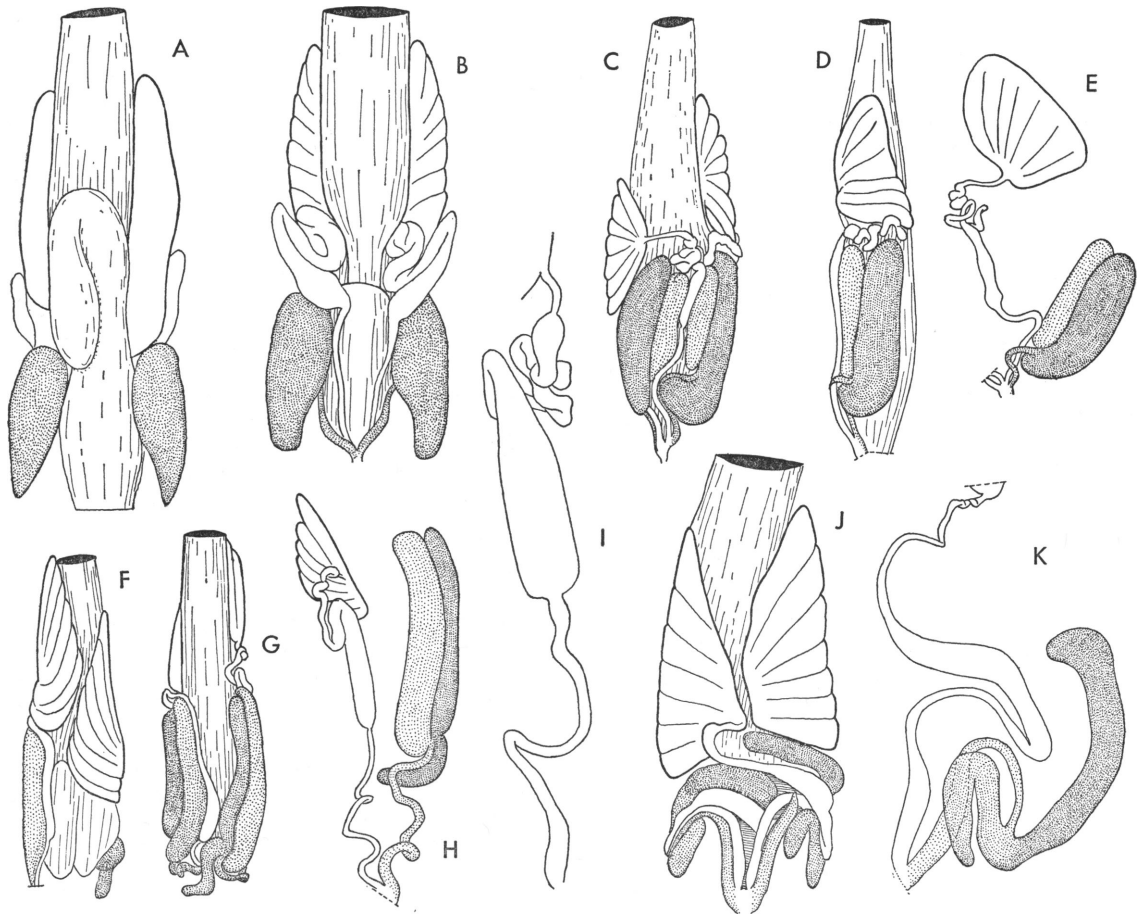


FIG. 10. Male reproductive system. Testes and vasa deferentia, blank; mesadenia and vasa efferentia, stippled. A, B. *Polytoxus* sp. (Saicinae). A. Dorsal aspect. B. Seen from below. C–E. *Ploiaria mosconai* (Emesinae). C. Ventral view. D. Seen from left side. E. Left half, isolated. F–H. *Bagauda lucifugus* (Emesinae). F. Dorsal view. G. Ventral aspect. H. Left half, isolated. I. *Lhostella leleupi* (Emesinae), vas deferens. J, K. *Orthunga* sp. (Emesinae). J. Ventral view. K. Left half, isolated; testes not shown.

lateral; follicles spread rather widely backward and forward. Vas deferens extensively coiled shortly beyond emergence from testis. Accessory glands parallel-sided, wide, not more than three times as long as wide, basal projection of opaque gland extremely short; vas efferens shorter than half of length of glands. Vasa deferentia and efferentia not distinctly coiled before their junction.

Ploiaria wahrmani: General structure similar to that of foregoing species, but appendix of opaque gland longer, and vasa deferentia and efferentia somewhat coiled before joining.

Bagauda lucifugus (FIG. 10F–H): Testes almost completely dorsal, follicles directed forward toward middle. Vas deferens shortly coiled and bent at emergence from testis. Accessory glands elongate cylindrical, about seven times as long as wide; appendix of opaque gland finger-like, almost half as long as main lobe. Vasa deferentia and efferentia strongly coiled before junction.

Lhostella leleupi (FIG. 10I): Very similar to *Bagauda lucifugus* but vas deferens abruptly widened at beginning of basal coil.

Orthunga SP. (FIG. 10J, K): Testes latero-ventrally situated, follicles widely spread. Vas deferens only very shortly coiled beyond emergence from testis. Seminal vesicle not abruptly widened, gradually confluent with vas deferens. Accessory gland forming a continuous, slender, tubelike structure, opaque

before and translucent behind insertion of vas efferens. Vasa deferentia and efferentia widened and not coiled before junction.

Only three genera of the large tribe Emesini could be examined. The testes are composed of seven follicles. The seminal vesicle is variable in length, subcylindrical in shape. The accessory gland is simple and varies in shape; the vas efferens is straight.

Myiophanes fluitaria (FIG. 11A–C): Testes lateral, elongate, slender, four follicles bent forward, three bent backward. Vas deferens bent shortly near emergence from testis; remainder straight. Seminal vesicle elongate, not abruptly widened, gradually confluent with vas deferens, occupying most of length of latter. Accessory gland simple, elongate-cylindrical, more than four times as long as wide. Vas efferens straight, very short, about one-fourth as long as mesadenia.

Stenolemoides arizonensis (FIG. 11F): Testes lateral, very small in relation to width of abdomen, compact. Vas deferens bent and coiled basad and apicad of seminal vesicle; latter cylindrical, abruptly widened, situated nearer to testis than to posterior extremity of vas deferens. Accessory gland small, globular; vas efferens straight, four times as long as gland.

Gardena SP. (*melinarthrum* GROUP) (FIG. 12A–C): Both testes ventrally situated, adhering to body wall, strongly flattened dorsoventrally, follicles subparallel, not well individualized, forming half spiral, open caudad. Vasa deferentia with single coil shortly beyond emergence from testes; seminal vesicle in shape of inconspicuous widening at level of coiled portion. Mesadenia elongate, subcylindrical, about 10 times as long as wide. Vas efferens short, about one-third as long as gland. Vasa deferentia and efferentia coiled before their junction.

In the three genera of the Ploiariolini examined, the testes are fusiform and vari-

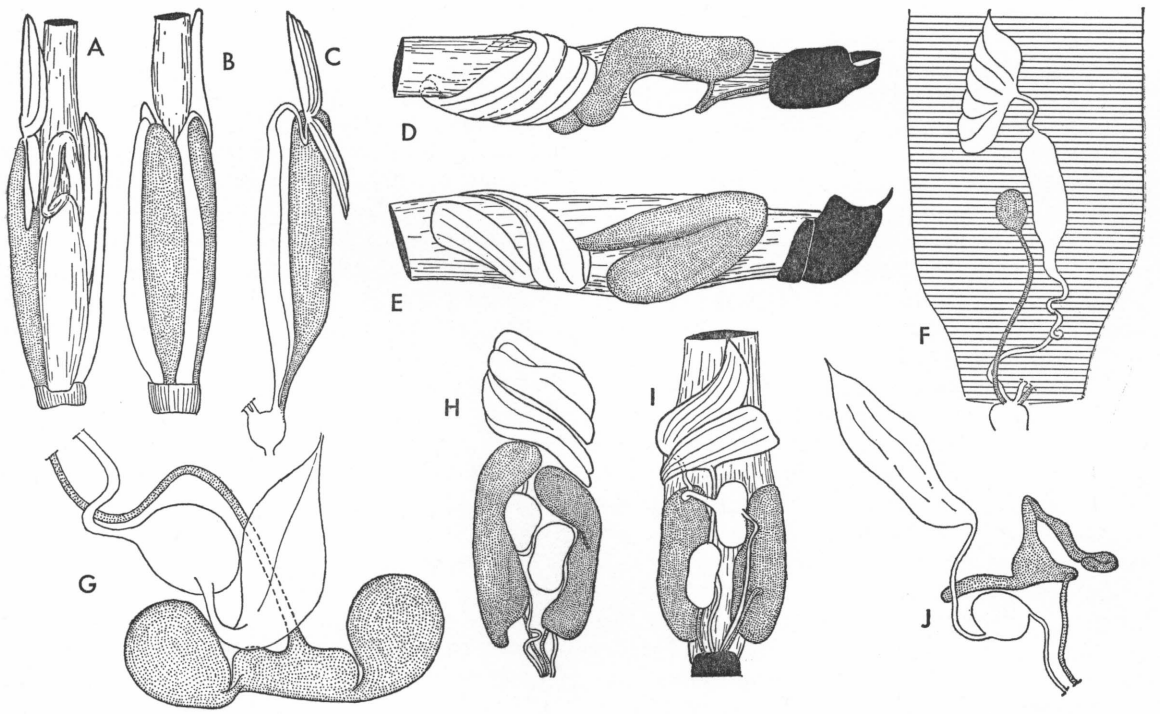


FIG. 11. Male reproductive system of the Emesinae. Testes and vasa deferentia, blank; mesadenia and vasa efferentia, stippled. A–C. *Myiophanes fluitaria*. A. Seen from above. B. Ventral aspect. C. Left half, isolated. D. *Empicoris rubromaculatus*, lateral aspect. E. *Empicoris* sp. (Adiopodoumé), lateral aspect. F. *Stenolemoides arizonensis*, dorsal aspect of left portion. G. *Saicella usingeri*, testes, seminal vesicle and mesadenia. H. *Empicoris rubromaculatus*, ventral view. I. *Empicoris* sp. (Adiopodoumé), seen from below. J. *Nesidiolestes roberti*, left half isolated.

ously arranged, the number of follicles being seemingly normal in at least one genus but reduced in others. The vas deferens is very narrow; the seminal vesicle, a short, conspicuous, bulbous swelling. The mesadenia are large and of varied, secondarily complex shape, and in no instance are simply tubular.

Empicoris rubromaculatus (FIG. 11D, H): Testes somewhat flattened, curved around intestinal tract, their pointed apical portion somewhat directed forward. Follicles seven in number, elongate and narrow, parallel. Vasa deferentia irregularly bent and twisted; seminal vesicle situated at about center of vas deferens, kidney-shaped, transverse in relation to vas deferens. Mesadenia opaque white, irregularly subcylindrical, somewhat curved; vas efferens emerging from posterior fourth of gland, slightly curved, but not coiled before junction with vas deferens.

Empicoris SP. (ADIOPODOUMÉ, IVORY COAST) (FIG. 11E, I): General structure as in *E. rubromaculatus*, but mesadenia relatively much larger, V-shaped, with arms directed forward.

Saicella usingeri (FIG. 11G): Testes laterally situated, small, fusiform, apparently consisting of only two follicles. Seminal vesicle situated very near to testes, subglobular. Mesadenia dumbbell shaped, consisting of a central, transverse, subcylindrical portion, and 1+1 subglobular portions narrowly connected to central part; vas efferens emerging from middle of central portion.

Nesidiolestes roberti (FIG. 11J): Testes small, fusiform, number of follicles apparently much fewer than seven. Seminal vesicle situated at some distance from testicle, subglobular. Mesadenia consisting of one central subtriangular portion and two finger-like appendages inserted on angles of triangle; vas efferens emerging from third angle.

In the one species of the Deliastini dissected, *Bergemesa brachmanni*, only the following could be established. Testes shifted as in remaining members of the Emesinae. General structure of testes and vasa deferentia as in the Leistarchini. Mesadenia in shape of a continuous cylinder.

Four genera of the Metapterini were examined. The number of follicles is mostly seven but is reduced to five in one genus. The shape of the testes and arrangement of the follicles are extremely diverse. In one case, the arrangement of the genital organs is secondarily symmetrical. The mesadenia are composed of a single, elongate gland, which in one case possesses a short basal projection.

Emesaya brevipennis (FIG. 12D, E, K): Left testis dorsally, right testis ventrally, situated; both slender, elongate, three follicles bent forward, four bent backward. Vas deferens straight; seminal vesicle represented by a short, inconspicuous widening shortly beyond emergence of vas deferens from testis. Mesadenia very elongate, subcylindrical, gland more than 15 times as long as wide, with a short, finger-like appendix basad of insertion of vas efferens, the latter straight, one-third as long as gland.

Barce fraterna banksii (FIG. 12J): Testes dorsolateral, compact, follicles short. Vas deferens almost straight; seminal vesicle represented by swelling of central portion gradually confluent with rest of vas deferens. Accessory gland elongate, subcylindrical, with a constriction at one-third of its length from apex; vas efferens slightly curved, more than half as long as mesadenia.

Bobba villiersi (FIG. 12F, G, I): Testes lateral, composed of five subparallel follicles each, those of left testes directed backward, of right testes directed forward. Vas deferens narrow upon emergence from testis, somewhat widened on remainder of its extension, especially on posterior half, this widening apparently representing seminal vesicle. Mesadenia elongate cylindrical, with a bulbous swelling beyond middle; vas efferens short.

Ghilianella uncinata (FIG. 12H): Reproductive system secondarily subsymmetrical. Testes very compact, irregularly elliptical; testes of right half of genital system situated in left portion, of left part of system in right portion, of bulbous subapical swelling of abdomen. Vasa deferentia crossed, narrow upon emergence from testes, forming moderately widened seminal vesicles on most of their extension. Mesadenia probably elongate cylindrical.

FEMALE REPRODUCTIVE SYSTEM

The fragmentary data available, both published and new, are not sufficient to contribute significantly toward the taxonomy of the Emesinae, but the few interesting facts

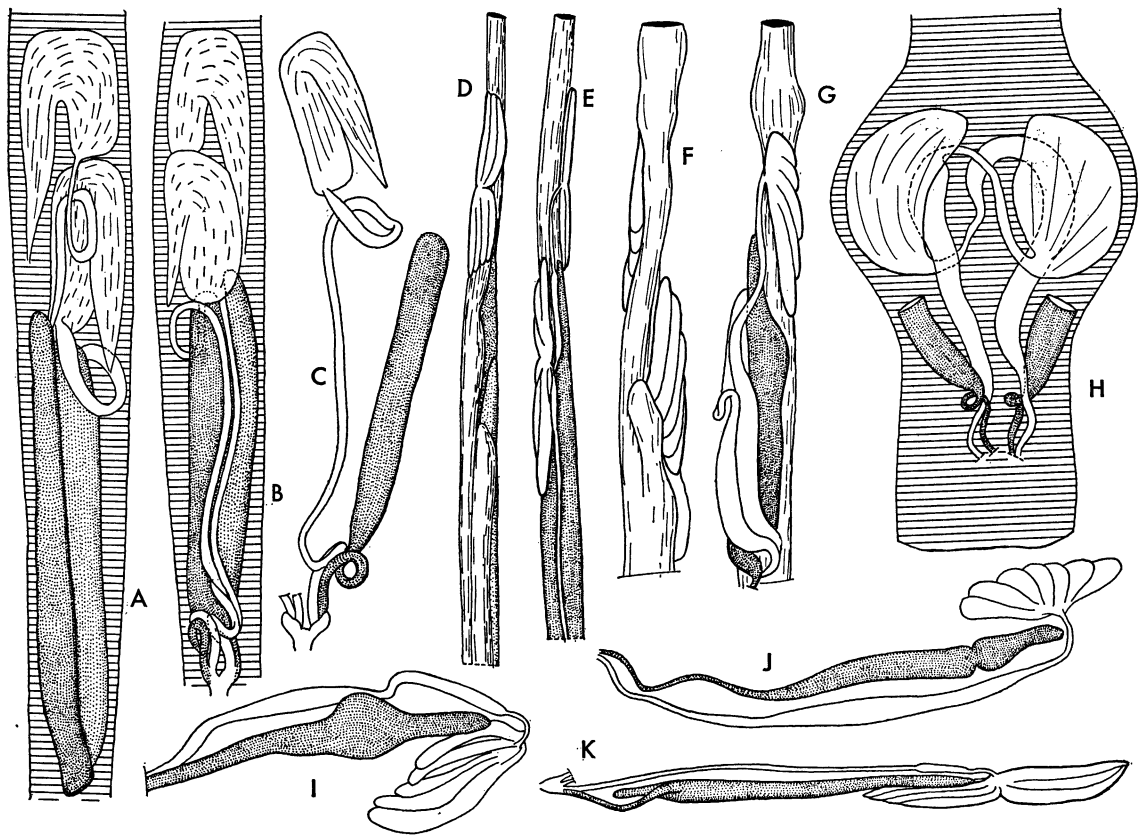


FIG. 12. Male reproductive system of the Emesinae. Testes and vasa deferentia, blank; mesadenia and vasa efferentia, stippled. A–C. *Gardena* sp. (*melinarthrum* group). A. Dorsal view. B. Ventral aspect. C. Right half, isolated. D. E, *Emesaya brevipennis*. D. Dorsal aspect. E. Ventral view. F, G. *Bobba villiersi*. F. Seen from above. G. Ventral aspect. H. *Ghilianella uncinata*, dorsal aspect; mesadenia incomplete. I. *Bobba villiersi*, left portion isolated. J. *Barce fraterna banksii*, right portion isolated. K. *Emesaya brevipennis*, right portion isolated.

that have come to light show the high potential value of the internal genital organs of the female for the taxonomy of the group.

The number of ovarioles per ovary is seven in most known cases: *Gardena muscicapa* and *G. melinarthrum* (*fide* Miyamoto, 1959), *Ischnonyctes marcidus* (*fide* Miyamoto, 1957), *Metapterus linearis* (*fide* Carayon, 1950b), and *Barce fraterna banksii* (personal observation); only six ovarioles per ovary are found in *Empicoris brachystigma* (*fide* Miyamoto, 1957).

Our knowledge of the ectodermal portion of the female reproductive system has been systematized and summarized by Dupuis (1955, 1963); his nomenclature is followed here.

The receptaculum seminis (vermiform gland), inserted on the dorsal wall of the vagina, has now been examined in one of the Emesini, several of the Ploiariolini, and various members of the Metapterini. The structural diversity observed is considerable. Though the receptaculum seminis has changed its functions to that of an accessory gland in the reduviids as in other Cimicimorpha, some of its component parts, as enumerated by Dupuis (1955, 1963), can still be recognized in the Emesinae. In the metapterine *Emesaya brevipennis* (fig. 13E) a short membranous ductus receptaculi is followed by a pyriform capsula seminalis, upon which inserts a convolute, somewhat irregularly shaped glandula apicalis with a very narrow lumen; the wall of its central ducts shows numerous small excrescences (fig. 13F). I

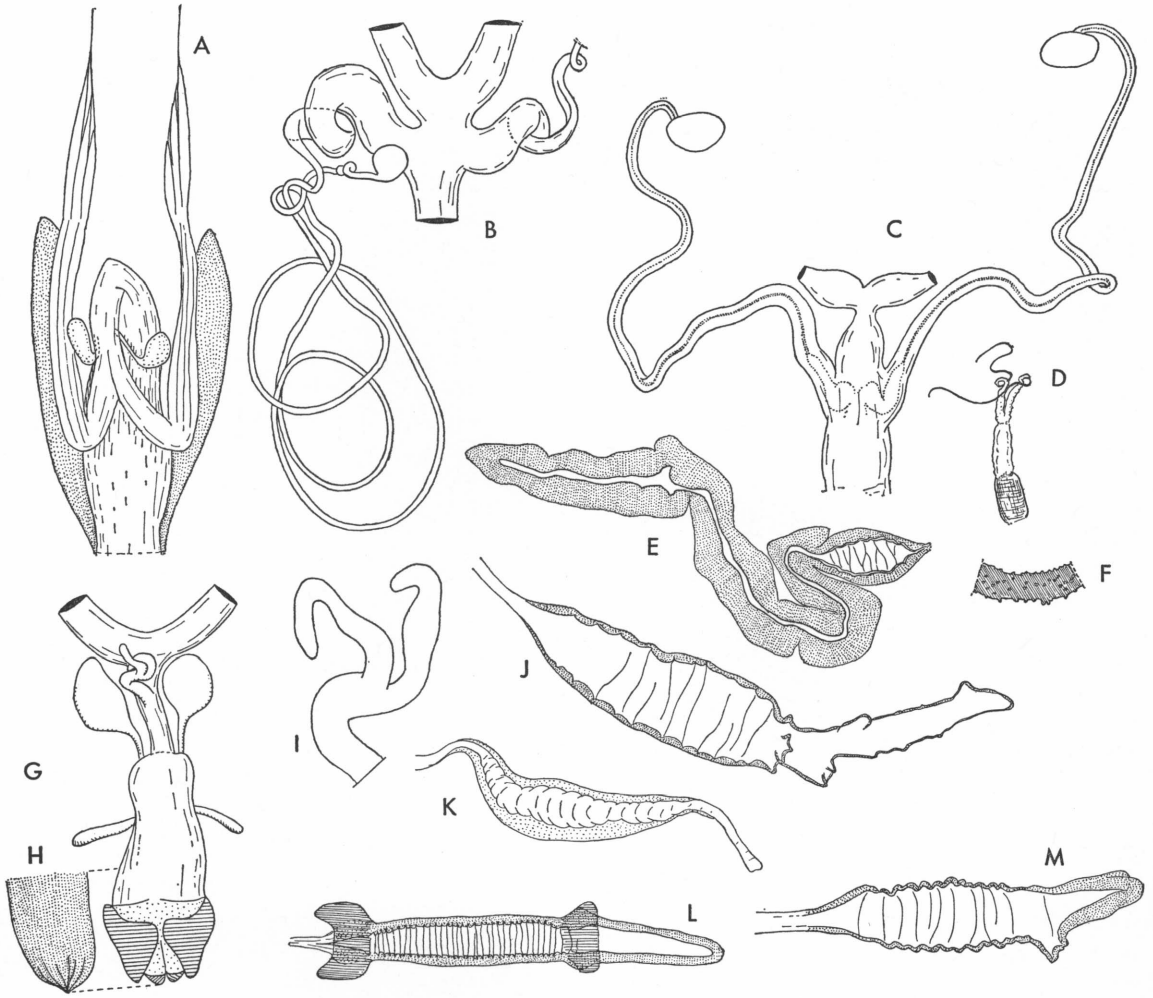


FIG. 13. Female reproductive system. A. *Polytoxus* sp. (Saicinae), general aspect. B–M. Emesinae. B. *Nesidiolestes roberti*, vagina, pseudospermathecae (one incomplete), and bases of oviducts. C, D. *Saicella usingeri*. C. Vagina, pseudospermathecae and bases of oviducts. D. Phallus, drawn to same scale as C. E, F. *Emesaya brevipennis*. E. Receptaculum seminis, general aspect. F. Portion of central duct of the glandula apicalis. G–I. *Barce fraterna banksii*. G. External genitalia, vagina with finger-like processes, pseudospermathecae, bases of paired oviducts, and common oviduct with bifid projection. H. Spermatophore. I. Bifid projection of common oviduct. J. *Ademula reticulata*, receptaculum seminis. K. *Emesopsis neptunis*, receptaculum seminis. L. *Panamia* sp. (Cuba), receptaculum seminis. M. *Malacopus banksi*, receptaculum seminis.

have observed very similar structures in the metapterine *Barce fraterna banksii* and *Metapterus linearis* and the emesine *Gardena* sp. At least in the two last genera, the glandula apicalis is much longer in relation to the capsula seminalis than in *Emesaya*. In the Ploiariolini examined, the capsula seminalis possesses an apical, either thick- or thin-walled prolongation differing from the main body of the receptaculum seminis by the lack of transverse striations; this apical portion is possibly a much reduced glandula apicalis (fig. 13J–M). The capsula seminalis is distinctly sclerotized. In *Panamia* (fig. 13L) it is symmetrical, like its apical projection, and has flangelike thickenings at its base and apex. In the nearly related *Malacopus* (fig. 13M) the receptacle and apical projection

are rather irregularly shaped, a condition also found in *Ademula reticulata* (fig. 13J). In *Emesopsis neptunis* (fig. 13K) the capsula seminalis is simple in structure and much less sclerotized than in the other species mentioned; the apical projection is membranous, short, and cylindrical.

Like other reduviids, e.g., the saicine *Polytoxus* (fig. 13A), the Emesinae possess 1+1 pseudospermathecae. In the Ploiariolini examined, the pseudospermathecae are narrow and elongate: *Empicoris vagabundus* (*fide* Pendergrast, 1957; personal observation), *Emesopsis neptunis* (personal observation), *Saicella usingeri* (fig. 13C), and *Nesidiolestes roberti* (fig. 13B). In *Nesidiolestes* and in *Saicella*, at the extremity of each pseudospermatheca there is a small subglobular ampoule in which sperm was found to be stored. In the two metapterine species in which the pseudospermathecae have been studied, *Ischnobaena* sp. (*fide* Scudder, 1959) and *Barce fraterna banksii* (fig. 13G), the pseudospermathecal ducts are very short, only about as long as the large terminal ampoule. In *Barce fraterna banksii*, the pseudospermathecae were found to store sperm, as expected, but an additional structure of identical function has now been discovered. A vermiform, apically bifid projection situated on the ventral surface of the common oviduct was found to contain sperm and thus acts as an additional sperm-storing organ (fig. 13G, I). Also in *Barce fraterna banksii*, the vagina possesses 1+1 lateral, finger-like processes (fig. 13G) found to contain an unidentified amorphous substance. The homologies of these paired appendices are not known; their function is possibly secretory. Their position is too far anterior to be paragenital glands in Bonhag and Wick's (1953) sense. Such paragenital glands might exist in certain of the Saicinae (*Polytoxus*, fig. 13A).

The considerable differences in the structure of the female reproductive system of the Ploiariolini and the Metapterini are possibly related to the mechanism of sperm transmission. In a female of the metapterine *Barce fraterna banksii* killed shortly after copulation, I have found a spermatophore in the posterior portion of the vagina, the posterior extremity of the spermatophore being shaped by the folded, fanlike, posterior gonapophyses (fig. 13H). No spermatophore was found under similar conditions in the ploiarioline *Empicoris*. In *Saicella usingeri* the complex phallus seems to fit perfectly into the basal portion of the vagina and the base of the spermathecal ducts (fig. 13C, D). It would seem that the whiplike vesica arms would enter for some distance into the narrow portions of the pseudospermathecal ducts; no spermatophore would thus be deposited, and the sperm would be injected directly into the pseudospermathecae.

Cytology

The chromosome cytology of the Emesinae has been studied only by Ueshima (1963). He found that in *Empicoris rubromaculatus* the spermatogonial complement is 14+XY in the male, and probably 14+XX in the female; and in *Barce fraterna*, the diploid chromosome complement 18+XY in the male, and 18+XX in the female.

BIOLOGY

MOST OF THE EMESINAE are nocturnal insects that hide during the day and come out at night to forage. Apparently there are some exceptions. Wickham (1909, 1910) observed the flight of *Emesaya brevipennis* late in the afternoon, and Wygodzinsky (1945c) mentioned the flying in daytime of a specimen of *Gardena faustina*. Gillett (1957) indicated that *Bagauda gilletti* may rest during the day and become active at night, though "after a few days' captivity some of them lost their nocturnal rhythm of activity and wandered at all hours."

GENERAL HABITATS OF FREE-LIVING SPECIES

Many species hide at considerable heights on bushes and trees, whence they can be obtained by beating. In Texas and Florida, clumps of Spanish moss (*Tillandsia usneoides*) seems to be a preferred habitat. Elkins (1951c) obtained from it the following species: *Emesaya brevipennis brevipennis*, *E. brevipennis australis*, *Empicoris orthoneuron*, *E. rubromaculatus*, *Barce aberrans*, *B. fraterna fraterna*, and *B. fraterna annulipes*. *Pseudometapterus umbrosus* can also be obtained from Spanish moss (personal observation). Blatchley (1926) indicated the same habitat for *Ploiaria setulifera* and *Empicoris rubromaculatus;* Hussey (1955), for *Ghilianella productilis*. A similar predilection for compact hiding places on trees exists in *Ploiaria yunquensis*, which Maldonado (1948) found in bromeliads in Puerto Rico.

The dense hanging fronds of tree ferns are a preferred niche of many of the Emesinae, especially the Ploiariolini. Myers (1926) beat *Empicoris rubromaculatus* occasionally from various trees in New Zealand but reported that "the greatest numbers can be secured from the dead hanging fronds of tree-ferns." A similar situation prevails in Hawaii, where Usinger obtained in Kauai a large number of specimens of all instars of *Empicoris rubromaculatus* and the endemic *Nesidiolestes roberti* and *Saicella usingeri* from fronds of tree ferns. Dead leaves of cabbage palmetto and royal palm made good collecting for Blatchley (1926), who found here three species of *Empicoris*, two of *Ploiaria*, and one each of *Emesaya* and *Pseudometapterus*, the latter from fallen palm leaves. The fact that the Emesinae, especially the Ploiariolini, are frequently intercepted by plant-quarantine inspectors (Jeannel, 1919; McAtee and Malloch, 1925; Wygodzinsky, 1954b; present paper) among orchids, bananas, or nuts also shows the preference of these insects for niches high above the surface.

Many species of *Empicoris* are frequently found on trees, on the foliage or on the branches. Southwood and Leston (1959) reported *E. vagabundus* "mostly upon trees" and *E. baerensprungi* "on various trees, chiefly those that are covered with lichen." Dicker (1941) found *E. vagabundus* abundant on various species of trees and considered that a "predacious insect such as this probably cares little which tree it lives on, provided an abundant food supply is available. . . . As far as could be seen the typical habitat was on the trunks and along the underside of the branches, especially where tufts of small shoots grew." Kirkaldy (1902) and Zimmerman (1948) mentioned Hawaiian *Ploiaria*, *Empicoris*, and *Nesidiolestes* from foliage and dead branches of trees. Bergroth (1906b) reported *Orthunga arborea* from trees in Madagascar. Reuter (1908) summarized the information given by numerous European authors on several species of *Empicoris* on various trees. He also related the presence of *Empicoris* to that of small insects which serve as their food. The encounter of *Empicoris vagabundus* in aphid galls on *Ulmus campestris* by Fieber (1860–1861) is probably also related to the abundant food supply to be found in the galls. The bark of trees in dark forests offers hiding places to species of *Ghilianella* (Haviland, 1931; personal observations). Gillett (1957) took *Bagauda gilletti* on the buttress trunk of a tree in tropical forest. Other species hide during the daytime under loose bark; I have found nymphs of *Stenolemus zikani*, several species of *Empicoris*, and nymphs and adults of *Bergemesa brachmanni* in this situation. Usinger (1951) reported *Ploiaria insolida* (as *uniformis*) "amidst loose sheaths on the trunks of coco-

nut." Blatchley (1926) took *Ploiaria carolina* from beneath the bark of a pine log.

Emesinae are found with certain frequency in birds' nests where they find protection as well as a permanent food supply, such as psocids and other small arthropods. Villiers (1949a) reported *Stenolemus grandidieri* from a nest of *Nycticorax*. Wygodzinsky (1950d) frequently collected *Bergemesa brachmanni* in abandoned birds' nests. *Empicoris baerensprungi, culiciformis,* and *rubromaculatus* find shelter in abandoned nests of pigeons, sparrows, and other birds. Hicks (1959) summarized the pertinent literature; additional information was given by Southwood and Leston (1959) and Wygodzinsky (1954b).

Boards and fallen tree trunks furnish hiding places for many of the Emesinae. Readio (1927) found *Barce fraterna* (as *Metapterus fraternus*) under sticks and boards. Villiers (1950, 1952b) reported *Ploiaria decorata* and *Ploiaria elegantula* from under tree trunks and pieces of wood. Miller (1953) found in "sheltered positions under . . . trees" *Tinna maculipes* and *Barrosia nuda*. Villiers (1950) mentioned *Gardena hirticornis* as collected under a tree trunk and later (1952b) *Empicoris angolanus* in an identical situation.

Like other reduviids, the Emesinae can be collected frequently under stones, such as *Barce fraterna* (Readio, 1927; personal observations) and *Bergemesa brachmanni*, which hides under rocks and piles of stones (Wygodzinsky, 1950d). Wygodzinsky (1954b) reported the same for *Ghinallelia* (as *Ghilianella*) *mariae;* Villiers (1952b), for *Ploiaria decorata, Tinna elongata, T. alata,* and *Barrosia colorata.*

Some forest-inhabiting species can be found in leaf litter where their dark color and slow movements make them difficult to observe. Mills (1931) noted this habitat for *Barce fraterna annulipes* (as *Metapterus annulipes*). Villiers (1950) mentioned *Ploiaria decorata* and *Orthunga overlaeti* and later (1952b) *Ploiaria decorata* from forest soil litter. A similar habitat was indicated by Wygodzinsky (1947a) for "*Dohrnemesa*" *feminata* and *Stenolemoides brasiliensis.*

Flood debris along a stream in Texas was found by Elkins (1951c) to harbor many of the Emesinae, viz., two species of *Emesaya* and one each of *Gardena, Empicoris, Barce* (as *Metapterus*), and *Ploiaria.* This habitat deserves additional exploration.

Low herbage offers protection to many of the Emesinae. *Pseudometapterus masatierrensis* and *P. kuscheli* were found at the base of ferns in dense forest (Wygodzinsky, 1951e). Southwood and Leston (1959) reported *Empicoris culiciformis* from low herbage. Lindberg (1932) mentioned that *Empicoris salinus* (as *Ploiariola salina*) had been taken on the soil under halophilous plants, and Dispons (1953) found *Ischnonyctes barbarus* "dans les lieux comportant des enchevêtrements d'herbes sèches."

Grasses seem to be preferred by some of the Emesinae. Southwood and Leston (1959) reported *Empicoris vagabundus* from under grass on sand dunes; Readio (1927), *Barce fraterna* (as *Metapterus fraternus*) from among grass roots; and Miller (1941), *Gardena muscicapa* (as *G. polita*) from among grass. Blatchley (1926) collected *Ghinallelia productilis* (as *Ghilianella productilis*) from bases of dense tufts of grass on a beach.

The above information amd many additional data indicate that several of the Emesinae that are found in grasses and other herbaceous plants show a preference for being near water. Douglas and Scott (1868) mentioned the fact that *Metapterus linearis* (as *Emesa dohrni*) was "taken . . . amongst weeds at the edge of a stream." Several specimens of an undescribed species of *Pseudometapterus* now before me were taken on *Typhus* sp. in a swampy place. A missionary in Manchuria reported that *Myiophanes tipulina*, called "water-mantis" by the Chinese, is found in swampy places (China, 1926a). Readio (1927) expressed the opinion that *Barce fraterna* seems to prefer a rather moist environment, but Blatchley's (1926) opinion that the species of *Barce* (as *Metapterus*) are hygrophilous or semiaquatic is doubtlessly an exaggeration.

Domestic and Peridomestic Species

Several of the Emesinae are found frequently in and near human habitations. This synanthropy may be partially responsible for the almost worldwide distribution of certain species. The name of the type species of *Ploiaria, domestica,* is indicative of the habitat of this species; it is seldom found free living,

at least in Europe. Another commonly domestic species, *Ploiaria chilensis*, was collected by Wygodzinsky (1946a) in Brazil in a house behind pictures on a wall. The distribution of this apterous species over several continents and its presence on many islands speak for dispersal by man.

The peridomestic habits of *Emesaya brevipennis* were noted in the description of the species by Say (1828), who found it in "outhouses, where it may be observed generally motionless on the walls." Uhler (1884) found the species on pine trees, but also stated that "it takes shelter in sheds, outhouses and barns." Several additional authors, including Readio (1927), have confirmed these habits.

Individuals of various species of *Empicoris* can be found frequently under roofs, window eaves, dark corners, and similar places, generally on the outside of houses and mostly on or near cobwebs, possibly having become attracted first by light. Southwood and Leston (1959) gave examples of the domestic and peridomestic habits of *Empicoris vagabundus* and *E. culiciformis*. Some older records are contained in Reuter (1908). *Empicoris* is another genus with several very widely distributed species. Man has possibly contributed toward their dispersal.

Cavernicolous Species

Several of the Emesinae are occasionally or consistently found in caves. In the New World, *Amilcaria lapinhaensis*, *Ploiaria umbrarum*, and *P. maya* are known only from caves. The same is true for the Ethiopian *Bagauda tenebricolus*, *B. adami*, *B. smithersi*, *Lhostella meyana*, *Myiophanes speluncarum*, *M. leleupi*, and *Berlandiana decaryi*, and the Oriental *Bagauda cavernicola*, *B. lucifugus*, and *Myiophanes kempi*. Others, such as *Bagauda creppei*, *Lhostella congoensis*, *L. africana*, and *Myiophanes fluitaria*, are found in, as well as on the outside of, caves. Though some of these species are found near the cave entrances, others live in greater depths and complete darkness, such as *Myiophanes kempi*, as was reported by China (1926a).

Kemp (1924), discussing the cavernicolous *Bagauda cavernicola* and *Myiophanes kempi*, made remarks that might well be applied to the rest of the cavernicolous Emesinae: "At first sight both. . ., with their narrow bodies and enormously long and slender antennae and legs, present every appearance of adaptation to a cavernicolous existence. This appearance is, however, deceptive, for both belong to a subfamily containing many out-door species, which is characterized by the great length of these appendages. . . . These two bugs . . . found themselves at the time of their immigration well suited to existence in the cave. There is no evidence that they have been modified in response to their environment." Similar thoughts were expressed by Villiers (1949a), who stated that the cave-inhabiting Emesinae are "en aucun cas . . . de vrais cavernicoles et nous n'avons toujours que des troglophiles." He believed that the presence of these insects in caves is "une adaptation actuelle, ou tout au moins récente, à la vie dans les cavernes, d'espèces forestières obscuricoles et hygrophiles qui trouvent dans les grottes à la fois l'obscurité et l'humidité qu'elles recherchent, en même temps qu'une abondante nourriture fournie par les nombreux diptères et lepidoptères se réfugient dans les grottes."

It should be stressed that in cavernicolous emesines no reduction of the eyes or loss of pigment is observed, though some species (especially in the leistarchine genera *Ploiaria*, *Bagauda*, and *Lhostella*) are rather pale. The legs of some cavernicolous species also are longer than usual (pl. 3, fig. 1), though the longest legs in relation to the body size of any Emesinae have been found in the free-living *Mayemesa paraensis* (fig. 79C).

Species Inhabiting Spider Webs and Psocid Webs

The Emesinae have been reported as associated with spider webs by several authors. The first such report seems to have been by Distant (1903e), who later (1915), as did Gravely (1915), confirmed the collecting of *Eugubinus* from spider webs, viz., *araneus* from the nest of a species of *Theridion*, and *Eugubinus reticolus* and *E. intrudans* from webs of *Cyrtophora cicatrosa*. *Eugubinus papuensis*, described in the present paper, was found in cobwebs. This habit is not restricted to the Oriental representatives of the genus. The Ethiopian *E. leleupi* has been found exclusively in spider webs (Villiers, 1949b).

A second emesine genus, *Emesaya*, is also found to be definitely associated in many cases with spider webs, as testified by Wickham (1910), Smith (1910), Howes (1919), Readio (1926), Usinger (1941), and Brown and Lollis (1963). Usinger summarized previous observations in addition to his own data. He kept specimens in captivity, thus being able to confirm observations made in the field by others who had seen *Emesaya* hanging from cobwebs: "The bugs lived thus for months, suspended upside down from spider webs . . . That they never became entangled in the webbing is remarkable considering their large size and apparent awkward locomotion." Readio (1927) also noticed that "the insect . . . can make its way over a web without any embarrassing entanglements." He had, however, found individuals entangled in webs, but did not state if they were dead or alive. Other metapterine Emesinae found on spider webs are *Barce fraterna* (Usinger, personal communication) and *Pseudometapterus docilis*, a specimen of which I observed suspended in a spider web.

There are few records referring to the Leistarchini. Usinger (personal communication) has seen *Ploiaria carolina* on a spider web, and Kemp (1924), referring to the habits of *Bagauda cavernicola*, which eats *Theridium*, "never found a bug entangled in the ill-formed webs of the spider or being devoured by it."

In addition to *Eugubinus*, other emesine Emesinae inhabit spider webs. Usinger (personal communication) found nymphs, cast skins, and adults of *Stenolemus lanipes* on spider webs in a chicken house in Georgia. I have observed on several occasions in the Yungas del Palmar of Bolivia nymphs and adults of *Stenolemus* in spider nests situated under the roofs and in large cracks in stone walls of buildings in forest openings. The insects hung in the webs upside down, suspended by their mid and hind legs. Frequently, individuals representing several instars were found together in the same spider nest. Villiers (1962a) gave definite evidence of the finding of *Gardena araneophila* on large spider webs over a river. Maldonado and Farr (1962) mentioned that *Emesa mantis* was collected from spider webs on steep rock walls; also exuviae were often found on the webs.

The ploiarioline *Empicoris* has been reported from spider webs by numerous authors, such as Downes (1924, 1927), Hussey (1921), and Dicker (1941). The last-named author wrote that "those places where nymphs of *E. vagabundus* were frequent . . . were invariably interlaced with a network of spiders' webs. . . . the nymphs could stride over a web without becoming entangled." The same author also stated that "another favourite haunt was close by a nest of psocids." Schumacher (1911) wrote that his *Empicoris morstatti* (as *Ploiariola morstatti*) had been collected in "Copeognathen-Nestern" in Africa. Green (1913) recorded *Empicoris politus* (as *Ploiariola polita*) from webs of *Archiopsocus* sp. I have collected *E. rubromaculatus* near Rio de Janeiro in large numbers resting on or slowly striding over psocid webs on the surface of leaves of a dwarf coconut palm. Large numbers of nymphs and adults of the same species were taken by J. MacSwain (personal communication) in Strawberry Canyon, Berkeley, California, on the surface of leaves on trees where psocids with their webs were present. Placed in Petri dishes, together with these leaves, specimens would stride indifferently on the webs or any other surface, never becoming entangled in the former. One female produced numerous eggs which were invariably suspended on threads of the web, even though other surfaces were available (pl. 2, fig. 8; pl. 4, fig. 4).

It can be considered that the wide spread of the mid and hind legs of the Emesinae constitutes a preadaptation to life on spider webs. The peculiar modifications of the claws, as described in the present paper, with those of the forelegs being similar to those of many spiders (fig. 4E), and the frequent presence of a calamistrum-like structure on the upper surface of the fore tibia (fig. 3N, O) are probably correlated with this peculiar mode of life. It may be significant that species of the tribe Leistarchini have been only very rarely recorded as inhabiting spider webs; in this tribe, the claws are not modified, and the calamistrum-like structure is only rarely found. The following description (Gravely, 1915) of the behavior of *Eugubinus* in the

dome-shaped web of *Cyrtophora cicatrosa* seems to imply the possible function of some of the structural modifications of the legs of the bugs, and indicates a considerable degree of adaptation to life in spider webs: "When [*Eugubinus*] settles down on a *Cyrtophora* web, instead of getting entangled it seems quite at home. When, however, it wishes to make its way into the inner parts of the framework, its long legs appear to be much in the way. If it cannot find room to get between the strands in the direction in which it wishes to go, it proceeds to cut some of them with its raptorial front legs; but these seem ill-adapted for the purpose, and progress is very laborious and slow." The very graphic description given by Howes (1919) of the behavior of *Emesaya brevipennis* which he found to "congregate in hundreds about certain webs" throws considerable light on the type and degree of adaptation of these bugs to life in spider webs: "The instant a victim becomes entangled in the spider web, a most ridiculous stampede follows to see who will first reach and bear off the juicy morsel. The absurdity of this event is increased by the fact that the would-be stampeders cannot possibly move rapidly. The sight reminds me of that nightmare wherein I am in dire need of running, yet try as I may, I can move no faster than a snail."

The reasons for the presence of the emesines in spider or psocid webs are almost certainly to be found in the relatively abundant food supply provided by the webs, but, as shown below, authors do not agree in the exact nature of this food. The evidence given by various authors may be interpreted to indicate that the food of web-inhabiting emesines is constituted either of the spiders and psocids themselves or the insects entangled in the spider webs, or both.

Food

The earliest observation on the food habits of the Emesinae is one by Scopoli (1786–1788, vol. 3) referring to *Ploiaria domestica*. This report was summarized by Mulsant and Rey (1873) who said that the species "se nourrit principalement de petites tipules et de cousins, qu'elle saisit avec ses pattes antérieures, faisant l'office de pinces, et suce, à l'aide de son bec, les humeurs contenues dans le corps de ses victimes." Schulze (1919) found *P. domestica* feeding on blood-gorged *Phlebotomus* in Macedonia. Roubaud and Weiss (1927) stress the potential usefulness of a North African species of *Ploiaria* as a predator of mosquitoes and *Phlebotomus*. Villiers (1949a) confirmed the previous authors' information on the feeding habits of *Ploiaria domestica* and recorded an observation made by Collart in the Congo of a nymph of *Ploiaria* capturing and feeding on a *Mansonia* inside a room. Maldonado (1948) observed the free-living *P. yunquensis* feeding on small Fulgoroidea. Gillett (1957) fed *Bagauda gilletti* on mosquitoes; small individuals would only accept mosquitoes of very small size. *Bagauda cavernicola* was found by Kemp (1924) in the Batu Cave, Malaya, feeding mostly on adults of certain Microlepidoptera and on the small spider *Theridion rufipes*.

Kemp (1924) indicated similar habits for *Myiophanes kempi*. The suggestion was confirmed by China (1926a), who said that *M. kempi* and *M. speluncarum* "prey upon small moths . . . , gnats and spiders." *Stenolemus lanipes* inhabiting spider webs were found by Usinger (personal communication) feeding on spiders, and Maldonado and Farr (1962) reported a similar instance for *Emesa mantis*. Gravely (1915) observed *Eugubinus* inserting its rostrum into egg cocoons of the spider *Cyrtophora* in the webs of which it lives. The bugs would also accept a spider after having been without food for a few days in a cage; occasionally a spider would attack and feed on a bug. Villiers (1962a) said that *Gardena araneophila* hunts dipterous insects on the spider webs where it lives.

Charbonnier (1903) fed *Empicoris* (as *Ploiaria*) *culiciformis* on a specimen of *Culex*. Green (1913) believed that *Empicoris* fed on the psocids in the webs of which the bugs occurred. My own observations in the laboratory fully confirm such a belief. Southwood and Leston (1959) stated that *E. baerensprungi* was "observed feeding on plant lice and other small insects."

Observations on the feeding habits of *Emesaya* are numerous but not conclusive. Howes (1919) stated that the bugs feed on flies and small bees that have become entangled in the spider webs where the bugs live. Wickham (1909, 1910) and Readio

(1927) observed occasional cannibalism; the later author fed *Emesaya* on a diet of various insects and was uncertain "in regard to whether the insect is dependent upon food caught in the spider web." Usinger (1941), who kept *Emesaya brevicoxa* in captivity, observed that the caged specimens would not feed on insects of various orders that were offered them but would readily accept spiders, "and subsisted, so far as observed, entirely on a diet of various species of spiders" for months. Brown and Lollis (1963) found that adults of *Emesaya brevipennis* that frequented the webs of agilenid spiders preyed upon the spiders themselves as well as on the insects caught in the webs. No field observations are available for *Barce*. Readio (1927) fed an adult of this genus in the laboratory on house flies, which were readily accepted. Mills (1931) maintained *Barce annulipes* with a diet of flies and aphids. I have found that specimens of *Barce fraterna banksii* would, under experimental conditions, capture and feed on machilids, which happen to be very common where these particular bugs had been collected. The bugs, as well as the machilids, are crepuscular and nocturnal, and were found together on the surface of rocks and the soil. As to other metapterines, Haviland (1931) stated that *Ghilianella* will eat termites "at any rate in captivity." Dispons (1953) found that first-instar *Ischnonyctes barbarus* did not accept psocids, but would feed on small Diptera and, less readily, on aphids; large nymphs accepted a great variety of insects. Dispons (*loc. cit.*) described the acts of feeding and of capturing the prey in detail; it is remarkable that *Ischnonyctes* were able to capture *Drosophila* in flight. Cannibalism was not observed.

It may be concluded from the foregoing that the Emesinae are entomophagous but will frequently also feed on spiders and occasionally on spider eggs. Their choice of prey seems to be determined mainly by the circumstances.

Attraction to Light

Like many other reduviids, the Emesinae are frequently attracted to light. Species belonging to the following genera have thus been reported: *Ploiaria*, *Bagauda*, *Orthunga*, *Stenolemus*, *Myiophanes*, *Empicoris*, *Emesopsis*, *Gardena*, and *Barce* (Horváth, 1924; McAtee and Malloch, 1925; Maldonado, 1948; Wygodzinsky, 1943, 1946a, 1951c, 1954b; Villiers, 1950, 1956c; Elkins, 1951a; and Miller, 1953). *Stenolemoides arizonensis* is also frequently found at light (personal observation), as is *Emesopsis nubilus* (Usinger, personal communication).

Generally, only solitary specimens are attracted by light, but very large numbers of *Gardena pipara* taken in a single night at light in Brazil (Wygodzinsky, 1954b) and of *Barce fraterna* collected in similar circumstances in Mexico are testimony of occasional mass dispersal flights.

Movements and Body Attitudes

One of the most characteristic attributes of the behavior of the Emesinae is the peculiar swaying motion which they frequently display when disturbed. This motion, observed in many genera, has been described by various authors (Jeannel, 1919; Kemp, 1924; Miller, 1953; Dispons, 1953). The motion may be lateral, as described by Miller (1953) for *Tinna maculipes*, which "swayed from side to side when disturbed," or " up and down with a slow rhythmic movement—a feature frequently seen in Tipulids and other long-legged insects," as described by Kemp (1924) for *Myiophanes kempi* and *Bagauda cavernicola*. The motion may be "parfois très lent, d'autres fois très rapide," as observed by Dispons (1953) for *Ischnonyctes barbarus*. The motion "peut s'effectuer en cours de marche ou a l'arrêt" (Dispons, 1953).

Kemp (1924) described differences in attitude of the forelegs when the specimens are at rest. In "*Bagauda cavernicola* the anterior femora are usually held straight out in front, in line with the body; in *Myiophanes kempi* they are flexed backwards over the head." The resting attitude of *Bagauda gilletti* agrees with that of the above species (Gillett, 1957); the same is true for *Barce fraterna banksii* (pl. 4, figs. 1, 2), *Emesaya brevipennis* (*fide* Howes, 1919), and *Ghilianella* sp. (my own observation).

Parasites

The only pertinent observation was reported by Readio (1927) who observed a small

unidentified hymenopterous parasite making its way out of an egg of *Emesaya brevipennis*.

Reproduction

A mating act in the Emesinae was first described and figured by Wickham (1909, 1910), who studied *Emesaya brevipennis*. Readio (1927) gave more data referring to the copulatory behavior of the same species. Dispons (1953) described and illustrated in much detail the mating in *Ischnonyctes barbarus*. My own observations on *Barce fraterna banksii* (pl. 4, fig. 1) agree rather well with those above, all of which refer to members of the tribe Metapterini. During copulation, which may last for hours and which may be repeated, the thorax and abdomen of the male form a conspicuous angle, the abdomen being bent downward. The forelegs of the male grab the female, generally near the base of the abdomen. The female bends her abdomen in a similar fashion during oviposition, as described below.

The only genus not belonging to the Metapterini in which copulation has been observed is the ploiarioline *Empicoris*. The male assumes an orthodox position over the female (pl. 4, fig. 3), the abdomen not being bent at all; the forelegs rest on the thorax of the female but do not grasp it. Copulation may last for several hours and may be repeated. Butler (1923) reported having taken *Empicoris vagabundus in copula*, but he did not describe the act.

These differences in the mating positions are correlated with structural differences. In those groups in which the basal abdominal sternite is normally sclerotized (fig. 7A), no flexing occurs. In the Metapterini, the proximal portion of the basal abdominal sternite is membranous, thus permitting the sharp downward flexing of the abdomen (fig. 7B).

The eggs of the Emesinae are laid singly. Dispons (1953) described and illustrated the oviposition in *Ischnonyctes barbarus*, which lays its eggs on the surface of leaves and twigs of certain plants. During oviposition, the female flexes her abdomen downward so as to form an acute angle with the thorax. Myers (1926) observed that *Ploiaria chilensis* (as *Ploiaria huttoni*) kept in a vial laid eggs on the surface or in cracks of a cork. Weed (1889) observed eggs of *Emesaya brevipennis* (as *Emesa longipes*) attached to bark of trees; Howes (1919) and Readio (1927), to rafters. Scopoli (1786–1788, vol. 3) reported the eggs of *Ploiaria domestica* as being glued to the substrate. *Barce fraterna banksii* was observed in captivity to cement its eggs to the surface of a piece of bark (pl. 4, fig. 5). Readio (1927) found some eggs of *Emesaya brevipennis* attached to a spider's thread, and Brown and Lollis (1963) found them commonly so attached. A female of *Empicoris rubromaculatus* associated with psocid webs suspended all its eggs on threads of this web, even though other substrates were available. The ridges of the eggs of this species, transformed into series of numerous toothlike lamellae, seem peculiarly useful for the purpose of suspending the egg (pl. 4, fig. 4).

The eggs of the Emesinae have been described and illustrated by many authors (China, 1926b; Dispons, 1953; Howes, 1919; McAtee and Malloch, 1925; Miller, 1953; Mills, 1931; Myers, 1926; Provancher, 1888;Readio, 1927; Scopoli, 1786–1788, vol. 3; Southwood, 1955; Villiers, 1949a; Weed, 1889; Wygodzinsky, 1945a, 1950d). Recent summaries on the subject have been produced by Villiers (1949a) and Southwood (1956).

Though emesine eggs are frequently rather elongate, as in *Gardena* (fig. 14A), *Emesaya* (fig. 14B), *Barce* (fig. 14C; pl. 4, fig. 5) and *Schidium* (fig. 14D), some genera possess more typically ovoid eggs: *Bergemesa* (fig. 14F), *Stenolemus* (fig. 14H, M), and others.

There seems to be a definite correlation between the general body form of the insects and the proportions of the eggs. The difference between the shape of the egg of the very slender *Schidium* (fig. 14D) and that of the relatively stout *Emesopsis* (fig. 14J) is quite striking.

The chorion is either smooth or delicately punctate or reticulate. In some cases it shows numerous minute irregularly arranged spiculets (fig. 14I, K).

In many genera the chorion has been found to possess longitudinal ridges formed by whitish cement. These ridges may be continuous, as in *Barce* (fig. 14C), *Ischnonyctes* (fig. 14E), *Bergemesa* (fig. 14F), and some species of *Empicoris*, or broken, as in *Emesaya* (fig. 14B) and certain *Empicoris* (pl. 4, fig. 4). Eggs with complete ridges have been found to

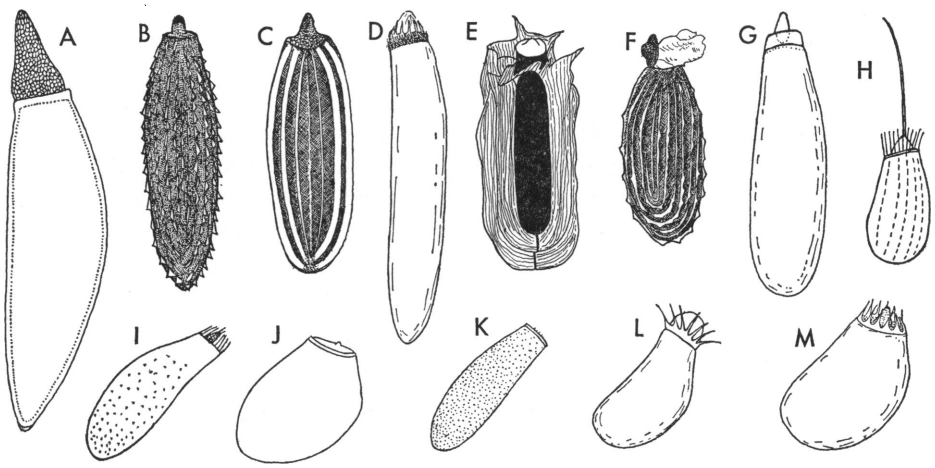


FIG. 14. Eggs of the Emesinae. A. *Gardena* sp. (*melinarthrum* group), Congo. B. *Emesaya brevipennis*. C. *Barce fraterna*. D. *Schidium matercula*. E. *Ischnonyctes barbarus*. F. *Bergemesa brachmanni*. G. *Mayemesa paraensis*. H. *Stenolemus marshalli*. I. *Ghilianella gladiator*. J. *Emesopsis nubilus*. K. *Tinna maculipes*. L. "*Dohrnemesa*" *feminata*. M. *Stenolemus hirtipes*. (B and C adapted from Readio, 1926; D, from Villiers, 1949a; E, from Dispons, 1953; H and K, from Miller, 1953; I, from McAtee and Malloch, 1925.)

be cemented to the substrate (pl. 4, fig. 5). Eggs that have broken ridges were, at least in some instances, observed to be suspended on strands of psocid or spider webs (pl. 4, fig. 4). The origin of the ridge-forming cement has not been established; it is probably secreted in the ectodermal portion of the female reproductive system. It is possible that the fanlike posterior gonapophyses so typical of the Emesinae and the Saicinae also contribute toward the shaping of the ridges. Many emesine eggs have been described from ovarian ova, in which the ridges cannot yet have been deposited, even in those in which they might be present later. Thus, cement ridges may ultimately be found to exist in many more genera than those enumerated above.

The rim of the corium is either confluent with the base of the operculum or more or less salient. In the latter case, the rim of the corium is either narrowly ring-shaped and simple, as in *Gardena* (fig. 14A), *Mayemesa* (fig. 14G), *Emesopsis* (fig. 14J), and *Tinna* (fig. 14K), or bears a crown of filamentous processes, as in *Schidium* (fig. 14D), *Ghilianella* (fig. 14I) *Stenolemus* (fig. 14H, M), and "*Dohrnemesa*" *feminata* (fig. 14L).

In *Gardena* (fig. 14A) the operculum is one-fourth as long as the whole egg, conical and conspicuously reticulate. In the remaining genera, the operculum is much shorter, subglobular in shape in "*Dohrnemesa*" *feminata* (fig. 14L), and somewhat flattened and having a nipple-like central prominence in the remaining genera (fig. 14B, C, F, G, and so on). The very long central filiform process of *Stenolemus marshalli* is unique (fig. 14H). The surface of the operculum is smooth, reticulate, or punctate.

No characters or combination of characters has been found that would permit the correlation of the egg structure with higher taxonomic units within the subfamily, although, insofar as the meager evidence permits one to deduce, the type of egg is rather similar within each genus.

Scopoli (1786–1788, vol. 3) indicated an incubation period of six days for *Ploiaria domestica*. China (1926b) reported oviposition of *Empicoris culiciformis* (as *Ploiaria culiciformis*) at the end of August, and observed hatching of the eggs the same fall. The eggs of *Emesaya brevipennis* are laid in September and October and hatch in late spring (Readio, 1927; Brown and Lollis, 1963), but there may be two generations per year (Brown and Lollis, 1963). The eggs of *Barce fraterna* are laid in the late fall (Readio, 1927; personal obser-

vation); it seems probable that the eggs normally overwinter. Miller (1953) reported an incubation period of six days under laboratory conditions for *Tinna maculipes*, and 10 to 18 days for *Stenolemus marshalli*. Dispons (1953) observed that eggs of *Ischnonyctes barbarus* laid in the autumn and winter, from early November to the end of January, all hatched in the first days of April; thus their incubation period lasts from two to five months. Gillett (1957) indicated an incubation period of two to three weeks for *Bagauda gilletti*.

Pascoe (1888) reported that he found a species of *Ghilianella* "with the young larva—whose long and slender abdomen was coiled round the thorax—securely riding on its back." This observation has not been confirmed by any other author and thus remains the only datum on maternal care in the Emesinae.

The biology of emesine nymphs does not differ essentially from that of the adults. Information on the behavior of nymphs is scattered through the literature. Isolated descriptions of emesine nymphs have been published by several authors. Villiers (1949a) gave a short summary of the morphology of African emesine nymphs. Fracker and Usinger's (1949) key to Nearctic reduviid nymphs facilitates the determination of nine genera. A careful comparative study of the emesine nymphs on a worldwide basis is still needed.

PHYLOGENY AND EVOLUTION

IT HAS LONG BEEN RECOGNIZED that the Emesinae are very close to the Saicinae. This relationship is suggested by the shared losses of ocelli, a well-developed corium, and dorsal, abdominal, scent-gland openings. The modification of the posterior gonapophyses of the female, which in both subfamilies have been transformed into peculiar fanlike structures (fig. 9E), also indicates close affinity.

Such highly envolved genera as *Polytoxus* (Saicinae) or *Gardena* (Emesinae) are easily placed in their respective subfamilies, but the position of certain less-derived or somewhat aberrant forms can become more difficult to establish. I have thus found it necessary to reevaluate the characters separating the Saicinae and the Emesinae and defining the different tribes of the latter.

The following considerations are based on the premise that in phylogenetic taxonomy a valid group can be established only by demonstrating in its components the presence of synapomorphic (shared derived) characters. Symplesiomorphic (shared primitive) features are not proof of the recency of common origin (Hennig, 1953) and thus not valid criteria for the definition of a taxonomic assemblage, just as autapomorphic characters (derived or specialized features restricted to a single taxon) are not significant for the elucidation of the relationships of this taxon.

The assumed phylogenetic relationships of the Saicinae and the Emesinae and of the emesine tribes, as suggested in the present paper, are represented in figure 15. Detailed information on the morphological features discussed below can be found in above sections of this paper.

The most plesiomorphic genus of the saicine-emesine group is *Carayonia* Villiers, even though it exhibits certain autapomorphic characters such as the very slender legs and elongate scutellar spine and the highly polished body surface. The following features, most of which are found in all non-specialized reduviids, are clearly plesiomorphic within the framework of the emesine-saicine group: the relatively stout body; the presence of spines on the under surface of the head, the upper surface of the rostrum, and on the fore coxae (fig. 18D); the rather short second and long third antennal segments; the downwardly opening anterior acetabula (fig.18D); the structure of the forewings (fig. 5B), with their two normally developed cells; the insertion of the portion of M limiting the discal cell upon the r-m cross vein; the fact that the pterostigma is not carried beyond the level of the tip of the discal cell; and the well-individualized third gonapophyses of the female. *Carayonia* is the only genus of the saicine tribe Visayanocorini Miller and is restricted to the tropics of the Old World.

A hypothetical ancestor (number 0 in fig.15) similar to but not identical with *Carayonia* may well be imagined to have given origin to both groups under discussion. The Saicinae have retained a larger number of plesiomorphic characters, such as the stout body, the spines on the head, rostrum, and fore coxa (frequently transformed into stiff bristles but still different from common setae), the relatively short second and relatively long third antennal segment, the downwardly opening anterior acetabula and short fore coxa, and the well-individualized third gonapophyses in the female. In the Emesinae, which represent the apomorphic branch of the assemblage, the body becomes progressively more slender and elongate, the spines or spinelike setae of the head, rostrum, and fore coxa tend to disappear, the second antennal segment becomes relatively longer and the third shorter, the anterior acetabula invariably open forward instead of downward, the fore coxa becomes long and slender, and the third gonapophyses of the female fuse to form a single sclerite. In connection with the narrowing of the body, the testes are no longer symmetrically placed as in the Saicinae and other reduviids. They shift in relation to each other, the one on the left side being situated anterior to the one on the right. Additional peculiar modifications of the arrangement of the testes are frequently observed.

In the more highly evolved representatives of the Saicinae and the Emesinae certain parallel specializations also occur, viz., a progressive lengthening of the first segment of the fore tarsi, certain modifications of the ve-

nation of the forewings, with a frequent reduction of the number of cells to one (though this is attained in several different ways), a migration of the portion of M limiting the discal cell toward an insertion on Sc+R, and an apicad-directed migration of the pterostigma; the phallus occasionally becomes asymmetrical.

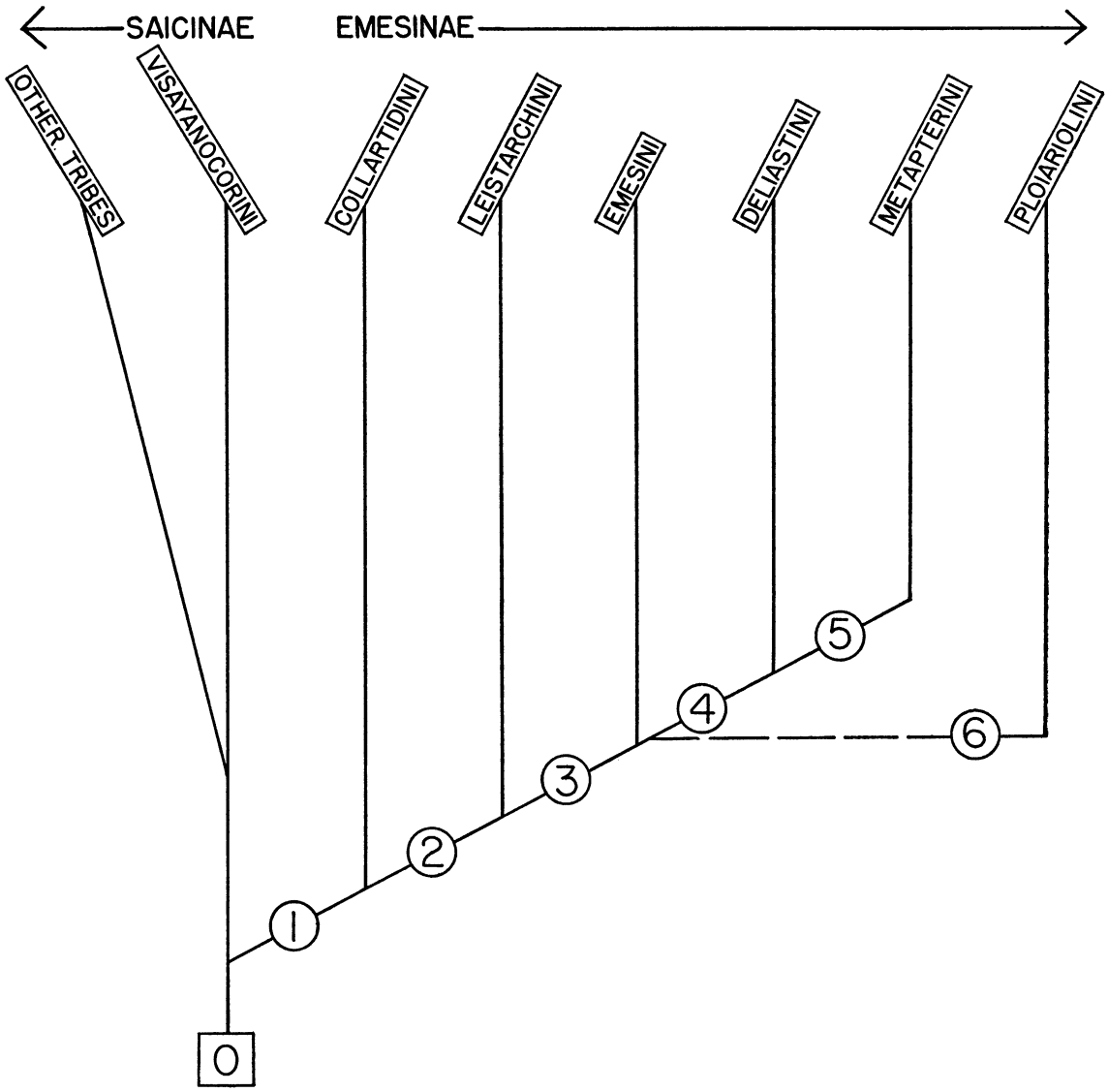


FIG. 15. Diagram representing the probable phylogenetic relationships between the Saicinae and the Emesinae, and among the tribes of the Emesinae. The vertical dimension represents time; the horizontal one, evolutionary divergence. No attempt has been made to represent absolute time or the degrees of difference between the taxa; only the sequence of events is shown. The O included in a square symbolizes the hypothetical common ancestor of the Saicinae and Emesinae; the circled numbers symbolize the successive appearance of apomorphic characters, as detailed in the text. The main characters thus represented are the following: 1, forwardly opening anterior acetabula, and pterostigma carried beyond level of apex of discal cell; 2, increase of relative length of first segment of fore tarsi; 3, structure of claws modified, and portion of M limiting discal cell inserted on Sc+R; 4, complete loss of mesonotal and metanotal spine, and posteroventral series of fore femur with large basal process; 5, eyes much reduced in size, loss of m-cu cross vein in hind wing; 6, phallus with conjunctiva and bifid vesica.

The most primitive emesines, the Collartidini, share many plesiomorphic characters with *Carayonia*, viz., the presence of conspicuous spinelike setae on the head, rostrum, and fore coxae (fig. 18C), the relatively short second antennal segment (not more than half as long as the first), the very short basal segment of the fore tarsi (fig. 18J), the still rather generalized venation of the forewings, with two large cells and the portion of M limiting the discal cell inserted on the r-m cross vein (fig. 18G), and the distinctly separated third gonapophyses of the female (fig. 18R). These characters caused Elkins (1962) to place the two collartidine genera *Collartida* and *Stenorhamphus* provisionally among the Saicinae. However, the Collartidini differ from the Saicinae by an array of apomorphic features which they share with the more conventional Emesinae. These characters are the forwardly opening anterior acetabula (fig. 18C), the slender and elongate fore coxa (fig. 18F), and the fact that the pterostigma is carried well beyond the level of the apex of the discal cell (fig. 18G). This evolutionary step separating the Emesinae from the Saicinae is represented in figure 15 by the number 1.

The considerable over-all resemblance of the Visayanocorini and the Collartidini is symplesiomorphic and expresses an approximately identical level of organization (grade). However, the synapomorphic features that the Collartidini share with the remaining Emesinae place them, together with the latter, into a separate phylogenetic lineage (clade).

The Collartidini must be considered as a bradytelic relict group, taxonomically as well as geographically, a frequent situation for extreme plesiomorphic components of a given higher taxon. The Collartidini and the equally plesiomorphic Visayanocorini are found only in the tropics, which suggests that the saicine-emesine assemblage as a whole began its differentiation in the warmer parts of the world. This hypothesis is in good agreement with the actual concentration of the great majority of the members of the two subfamilies in the tropics and subtropics.

All others of the Emesinae differ from the Collartidini basically by the increase in the relative size of the first segment of the fore tarsus, an evolutionary step (number 2 in fig. 15) preliminary to more advanced and often striking specializations of the tarsus (fig. 3G–M).

Among the higher Emesinae, there is again a plesiomorphic group, the Leistarchini, and an apomorphic component, the remaining tribes. The autapomorphic characters of the Leistarchini are the peculiar venation of the forewing, with a single cell (fig. 5E), the unique transverse thickening of the hind wings (fig. 6B, C), the reduction in the size of the arolia of the fore praetarsus (fig. 4C), and the characteristic armature of the endosoma of the phallus. On the other hand, the Leistarchini have retained a good number of plesiomorphic features, such as the simple claws (fig. 4C), the insertion of the portion of M limiting the discal cell on the r-m cross vein (fig. 5E), the maintenance by the testes (fig. 10C–E) of the usual subtriangular shape (though the above-mentioned shift has already taken place), and the fact that the mesadenia are composed of more than one lobe (fig. 10E). The remaining Emesinae are opposed to the Leistarchini by the apomorphic states of the characters just mentioned, viz., the presence of lamellae and variously shaped processes on the under side of the claws (fig. 4D, E, J), the insertion of the portion of M limiting the discal cell on Sc+R (fig. 5F, K), the frequently complex modifications in the shape and disposition of the testes, and the reduction of the mesadenial lobes to one (figs. 11, 12). Number 3 in figure 15 designates the acquisition of the specializations enumerated here.

Among the Emesinae with modified claws, the Emesini represent the least-specialized group from an over-all point of view, though the structure of the claws tends to be more complex than in related forms, and very intricate color patterns and types of ornamentation are frequently found here. The Emesini are opposed by the Deliastini and Metapterini, an assemblage defined (number 4 in fig. 15) by the complete loss of mesonotal and metanotal spines, the constant presence of a very large basal process to the posteroventral series of the fore femur (fig. 2C), a pronounced tendency toward an elongation of the fore tarsus, with concomitant abbreviation or elimination of its apical segments (fig. 3L, M), the short arolia, with frequently a more

or less pronounced reduction in size of the claws, the extension of the discal cell of the forewing to near the wing tip (fig. 5G, H), the presence of modified setae on the abdomen, and other details. Within this group, the Deliastini represent the plesiomorphic and the Metapterini the apomorphic component separated by evolutionary step number 5 in figure 15. In the Metapterini the eyes are much reduced in size, the beginning of the posteroventral series of the fore femur is distant from the base of the segment (fig. 2C), the discal cell of the forewing is either the only cell, or accompanied by a much-reduced subbasal cell (fig. 5H), and in the hind wing M has shifted to touch Cu directly for a short distance so as to eliminate the m-cu cross vein (fig. 6I). Here again, the range of the plesiomorphic group is restricted; the Deliastini are found only in the subtropical and tropical portions of the Western Hemisphere. The apomorphic component, the Metapterini, is worldwide in distribution, with representatives also in temperate climates.

The Ploiariolini cannot be placed with certainty in the present scheme. They are well defined by a large array of important autapomorphic characters, such as the reduction of the spines on the under surface of the fore tibiae (fig. 3A), the globular seminal vesicles of the male (fig. 11G), the numerous unique modifications of the phallus (presence of a conjunctiva and a bifid vesica), and the reduced syngonapophysis of the female. The Ploiariolini share the modified claws, the migration of M along Sc+R, and the reduction of the mesadenial lobes to one, with the Emesini, the Deliastini, and the Metapterini, but I have not been able to find a single unequivocally apomorphic character that the Ploiariolini would share with, and thus approach, either the Emesini or the Deliastini-Metapterini. It can be imagined that the Ploiariolini are opposed to the remaining tribes as a whole and possibly represent the apomorphic branch of the entire group. This tentative interpretation is represented by a stippled line in the phylogenetic scheme given here (number 6 in fig. 15).

It is of interest to note that the Leistarchini and the Deliastini-Metapterini group have independently acquired identical specializations, such as the frequent reduction in the size of the claws of the forelegs and concomitantly of the arolia, a pronounced tendency for an elongation of the fore tarsus, together with a reduction in the number of segments, and a proportionally high incidence of micropterous or apterous species. At the same time, it is virtually only in these groups that adaptation to semiarid conditions has taken place (for instance, Mediterranean, Sonoran, and South African *Ploiaria* and many *Tinna* in the Leistarchini, the South American *Bergemesa* in the Deliastini, and many of the Metapterini in various parts of the world).

CLASSIFICATION

THE FIRST EMESINE SPECIES was described by Linné (1758) as *Cimex vagabundus* (now *Empicoris vagabundus*). Scopoli (1786–1788) named the first genus, *Ploiaria;* his illustrations of *Ploiaria domestica* provided amazing structural detail, seldom surpassed in the history of emesine illustrations.

The earliest family-group name for the Emesinae was introduced by Amyot and Serville (1843) as "Émésides" for their Longicoxi.

Several additional genera and species had been described when Stål (1859) recognized the two assemblages Emesida and Ploiariida in the "Reduvina" (that is, the Reduviidae), obviously giving each of the mentioned groups subfamily rank.

Dohrn (1860, 1863), the first author to monograph the emesines on a worldwide basis, accepted a family "Emesina" containing the "Gruppen" Emesida and Ploiariida, identical in name but not in content to the groups suggested by Stål (1859). Dohrn (*loc. cit.*) criticized Stål's system, but his own arrangement of the genera in groups leaves much to be desired and need not be discussed here.

Stål (1862) divided the family "Emesida" into two assemblages, the Emesida and the Ploiariida, subdividing the former further into the Emesida (*sensu stricto*), with *Emesa* and *Ghilianella*, and the Leistarchida, with *Leistarches* and *Emesodema*. No examples were given for the Ploiariida, but the phrase "tarsis anticis distincte triarticulatis, flexilibus" makes it obvious that they were meant to include the genera around *Stenolemus* and what is now called *Empicoris*.

This arrangement was followed by a more elaborate one (Stål, 1874) summarized below. The actually valid names appear in parentheses.

Ploiariaria
- *Ploiaria* (*Empicoris*)
- *Malacopus*
- *Stenolemus*

Leistarcharia
- *Orthunga*
- *Tinna*
- *Cerascopus* (*Ploiaria*)
- *Luteva* (*Ploiaria*)
- *Leistarches*

Emesaria
- *Gardena*
- *Ghilianella*
- *Emesa* (*Emesaya*)
- *Ischnobaena*

Metapteraria
- *Barce*
- *Metapterus*
- *Ischnonyctes*
- *Bargylia*

Two changes on the genus-group level with rather confusing consequences in the nomenclature on the family-group level are those of *Ploiaria auct.* (*nec* Scopoli) to *Empicoris* (with its synonym *Ploiariola*) and of *Emesa auct.* (*nec* Fabricius) to *Emesaya;* more details follow.

Stål's classification, unjustly criticized by McAtee and Malloch (1925), comes surprisingly near the ideas developed by present-day authors. His Ploiariaria correspond to the actual Emesini plus Ploiariolini, but these two groups are being distinguished from each other for the first time only in the present paper. The Leistarcharia, a natural group, are still maintained as the Leistarchini. The Emesaria, from which only *Gardena* had to be removed (Villiers, 1948, 1949a), are now united with the Metapteraria as the Metapterini.

The arrangement proposed by Distant (1903e) in his work on Indian Emesinae cannot be considered as an improvement on Stål's system.

Kirkaldy (1902) introduced the name "Stenolemaria" for Stål's Ploiariaria. Stål, like most authors, had followed Latreille (1804) in applying the name "*Ploiaria,*" whence the Ploiariaria were derived, to a genus not identical with *Ploiaria* Scopoli. Thus Kirkaldy (1902) used *Stenolemus*, another genus included in Stål's Ploiariaria, to name his "division."

Van Duzee (1916, 1917) divided the Emesinae into three tribes, the Ploiarioliinae (*sic*), the Leistarchini, and the Emesini. "Ploiarioliinae" was a new name for Ploiariida Stål and Stenolemaria Kirkaldy. It is based on *Ploiariola* Reuter, a then-accepted name for *Ploiaria* Latreille (*nec* Scopoli).

Van Duzee's second tribe, the Leistarchini, was used correctly for *Ploiaria* Scopoli and its close allies, and the third tribe, the Emesini, contained *Emesa* (now *Emesaya*), *Ghilianella*, *Barce*, and *Gardena*, comprising Stål's Emesaria plus, by implication, the Metapteraria.

It is amazing that McAtee and Malloch (1925), as a result of a very exacting revision of the New World Emesinae, should have arrived at the conclusion that, "in our view attempting to recognize tribes of Ploiariinae [Emesinae] is no more likely at the present moment to elucidate the relationships of the genera, than one would be led to suppose from the futile attempts of the past." Stål's (1874) attempt was decidedly not futile, and that McAtee and Malloch failed to understand the fact is surprising. Later, in an extensive paper on Oriental Emesinae, McAtee and Malloch (1926) equally did not consider a rational arrangement of these insects.

Further progress in the higher classification of the Emesinae was made by Villiers (1948, 1949a) as a result of his monographic work on the African fauna. He divided the subfamily into seven tribes, as follows:

Deliastini, new tribe
Ploeariini
Orthungini, new tribe
Stenolaemini
Emesini
Metapterini
Ghilianellini, new tribe

The Deliastini is a natural group, now comprising three American genera, closely related to the Metapterini.

The Ploeariini and Orthungini, corresponding to Stål's Leistarcharia, share peculiar specialized features, such as the venation of the forewings and the unique transverse thickening of the hind wings, the frequent abbreviation of the hind lobe of the pronotum in winged forms, which leaves most of the mesonotum exposed, and the characteristic structure of the phallus, all of which closely associate these groups. The character adduced by Villiers to separate his two tribes, viz., the number of segments of the fore tarsus, is among the most plastic in the subfamily, and its value for the definition of higher groups within the Emesinae is not of prime importance. The differences between the male genitalia of both groups, not very clearly expressed by Villiers, are more apparent than real. It is concluded that the Orthungini cannot be maintained separate from the Ploeariini. In the present paper, the tribe Leistarchini is used to denominate this assemblage.

Villiers' Stenolaemini correspond to Stål's Ploiariaria. As mentioned above, this group is divided in the present paper into two well-defined tribes, the Emesini and the Ploiariolini.

Villiers (*loc. cit.*) apparently was not aware of McAtee and Malloch's (1925) contention that *Emesa auct.* (*nec* Fabricius) did not have a valid name; they therefore described it under the new name *Emesaya*. Consequently Villiers (1948, 1949a) maintained the tribal name Emesini for *Emesa auct.* (*nec* Fabricius), though he excluded from the tribe all other genera included in Stål's Emesaria.

Finally, Villiers separated the tribes Metapterini and Ghilianellini from each other, using such unreliable characters as the shape of the postocular portion of the head and the surface sculpture of the body. Originated for a classification of African forms, this division does not prove to be tenable when applied to the world fauna of the Emesinae. The genera included in both tribes suggested by Villiers agree in a considerable number of specialized features, such as the loss of scutellar and metanotal spines, the presence of a large spiniferous process at the base of the posteroventral series of the fore femur, the very elongate discal cell of the forewing, the fusion of the hamus to Cu in the hind wing, and certain characters of the genitalia. These shared characters are highly suggestive of close relationship and make it advisable to include all genera concerned into a single tribe, the Metapterini.

The arrangement proposed by the present author is as follows:

Subfamily Emesinae
  Tribe Collartidini, new tribe
  Tribe Leistarchini
  Tribe Emesini
  Tribe Ploiariolini
  Tribe Deliastini
  Tribe Metapterini

The characteristics of these tribes, as well as their probable evolution and phylogeny, are discussed under Phylogeny and Evolu-

TABLE 4

PRINCIPAL CLASSIFICATIONS OF THE EMESINAE

Stål	Villiers	Wygodzinsky
—	—	Collartidini
—	Deliastini	Deliastini
Leistarcharia	Ploeariini Orthungini	Leistarchini
Ploiariaria	Stenolaemini	Emesini Ploiariolini
Emesaria Metapteraria	Emesini Metapterini Ghilianellini	Metapterini

tion. The synonymy of the family-group names is given under the respective headings in the taxonomic section of this paper, but a few relevant items are discussed here briefly.

The main change as compared to former systems, in addition to the creation of a new tribe, the Collartidini, is the clear distinction of two separate units, the Emesini and the Ploiariolini, formerly treated as a single group, variously known as Ploiariaria, Stenolemaria, Ploiarioliinae, and so on. The name "Emesini" is used for the assemblage containing *Emesa*, the type genus of the subfamily, *Stenolemus*, and their allies. It is not identical with the Emesaria of Stål or Emesini of Villiers, based on *Emesa auct.* (*nec* Fabricius) (=*Emesaya* McAtee and Malloch). The name "Ploiariolini" is used for *Empicoris* (a genus of which *Ploiariola* Reuter is a synonym) and its allies. Thus it is applied in a more restricted sense than that of Van Duzee (1916, 1917).

The main classifications of the Emesinae, viz., those by Stål, Villiers, and the one proposed here, are compared in table 4.

GEOGRAPHICAL DISTRIBUTION

WHEN IT IS CONSIDERED that, among the 86 valid emesine genera, about 20 are known only from a single species collected only on a single occasion, it becomes obvious that our knowledge of the world fauna of these insects is too rudimentary to allow at this time a satisfactory analysis of their distribution. Even so, I have thought it useful to outline here certain facts and peculiarities of the geographical patterns now known, even if only to resurrect them from burial in the taxonomic sections of this paper and others, and to call attention to them. Furture research will possibly confirm and amplify certain patterns, seek a way for their explanation, and modify others as based on insufficient or faulty evidence.

I follow Gressitt (1961) and Usinger (1963) in considering the Papuan subregion and most oceanic islands of the Pacific (except the clearly Australian Lord Howe Island) to belong to the Oriental and not the Australian Region. For practical purposes, however, and in order to stress the significance of this area in the over-all picture of Emesine distribution, I have treated the oceanic islands of the Pacific (Micronesia, the Fiji Islands, Norfolk Island, Polynesia, and the Hawaiian Islands) as a separate though informal unit. Thus the term "Oriental Region" here refers only to that part of the region comprising the continental areas and subcontinental islands east to Melanesia and New Caledonia. I do not suggest the separation of the oceanic islands of the Pacific formally from the Oriental Region.

DISPERSAL

The "spread potential" (Leston, 1957) of the Emesinae is unusually high, as is attested by various significant facts.

There are four cosmopolitan genera (out of a total of 86) with often numerous native, though not necessarily autochthonous, species in each of the six traditional zoogeographical regions: *Ploiaria*, *Gardena*, *Stenolemus*, and *Empicoris*. There is not a single genus of any other reduviid subfamily with native species in all zoogeographical regions. There are at least 13 emesine species which are now found in more than one zoogeographical region:

Ploiaria chilensis: Palearctic, Nearctic, Neotropical, and Australian regions
Ploiaria macrophthalma: Neotropical, Oriental, Australian, and Ethiopian regions
Gardena brevicollis: Palearctic, Oriental, and Australian regions
Gardena melinarthrum: Oriental and Australian regions
Gardena muscicapa: Palearctic, Oriental, and Ethiopian regions
Myiophanes tipulina: Palearctic and Australian regions
Emesopsis nubilus: Neotropical, Oriental, and Ethiopian regions
Empicoris culiciformis: Palearctic, Nearctic, and Neotropical regions
Empicoris orthoneuron: Nearctic and Neotropical regions
Empicoris rubromaculatus: Palearctic, Nearctic, Neotropical, Oriental, Australian, and Ethiopian regions
Empicoris vagabundus: Palearctic and Nearctic regions
Barce fraterna: Nearctic and Neotropical regions
Schidium marcidum: Palearctic, Oriental, and Australian regions

The above list contains only cases with clear-cut evidence; species occurring in a given region and in an adjoining transition zone, but nowhere else, are not included. Among all the remaining Reduviidae, of which the Emesinae form only a small part, only very few species have managed to gain a foothold in more than one zoogeographical region:

Reduvius personatus: Palearctic, Nearctic, and Australian regions
Peregrinator biannulipes: Tropicopolitan
Triatoma rubrofasciata: Tropicopolitan
Triatoma rubrovaria: Neotropical and Oriental regions

Zelus renardii, found in North America and in Hawaii, could also be included in this last list.

The fact, already stressed by Leston (1957), that the Emesinae have settled on a large number of oceanic islands can only be attributed to their unusual spread potential. In many cases, the Emesinae are on these islands either the only, or certainly the dominant, native members of the Reduviidae (for examples, see Wygodzinsky and Usinger,

1960), whereas in continental or subcontinental areas they are almost always a relatively minor component of the total reduviid fauna.

A key to the wide range of some emesine taxa may be found in the domestic and peridomestic habits of certain small-bodied species, such as many in *Empicoris* and several in *Ploiaria*, which make dispersal through the agency of man a virtual certainty. Many other small-bodied members of the Emesinae, such as *Emesopsis nubilus* and several species of *Empicoris*, have been encountered in the United States of America by plant-quarantine inspectors in imported orchids and other vegetable matter. The discovery shows that under favorable circumstances emesine individuals will survive long-distance transport.

Dispersal through the air, though not yet proved for these insects, may be another way of long-distance travel. A favorable surface/volume ratio is characteristic of the Emesinae, either as a function of their often very small size (the Ploiariolini, many of the *Ploiaria*, and others) as compared to most other reduviids, or their medium-sized to large but exceedingly slender bodies and appendages. Such special features as the hair tufts on the legs of *Stenolemus* equally contribute to a proportionally large surface as compared to the insects' volume.

Though the spread potential of the Emesinae is important for an interpretation of some aspects of their distribution patterns, their ecological requirements also deserve consideration, especially those relating to temperature. Most genera and species show a preference for warmer climates, as demonstrated by the scarcity of the Emesinae at higher elevations and in regions of temperate or cold climate. It is significant that all cosmopolitan genera, viz., those with native species in all zoogeographical regions, occur in temperate as well as in warm climates. It seems that tolerance of a wider temperature spectrum is correlated with a special capacity for dispersal or permanency.

Geographical Zoology of the Emesinae

In the taxonomic section of this paper the range is given for each taxon, but generally it is not discussed. A short survey of our knowledge is therefore given here.

Collartidini: This tribe, the most plesiomorphic of the subfamily, is restricted to equatorial Africa (*Collartida*) and Ceylon (*Stenorhamphus*). As mentioned elsewhere in this paper, the restriction of the Collartidini, a relict group, to the ancient habitat of the humid tropical forest may be indicative of the zone of origin of the subfamily, which also now is concentrated in the tropics and subtropics.

Leistarchini: The most interesting feature in the over-all distribution pattern of this tribe is that, among the 23 recognized genera, only one, *Ploiaria*, is found in the Western Hemisphere; all others are limited to the Old World. *Ploiaria* is a cosmopolitan genus, with native species in all zoogeographical regions. In the New World, this genus is richest in species in North and Central America and the West Indies, and very poor in them in South America. *Ploiaria* is well developed in all Africa, and there is no appreciable decrease in the number of species from north to south, but the genus is completely absent from Madagascar. No explanation for the disharmonic over-all distribution pattern of the Leistarchini can be advanced at this time.

There is a rather large number of species of the Leistarchini in the Palearctic Region. They are restricted mainly to the Mediterranean subregion and belong almost exclusively to *Ploiaria*, but there are also a few *Tinna* that have infiltrated from the main geographical center of the genus, the Ethiopian Region, and the monotypic *Lethierrya* of North Africa, a genus with Ethiopian relationships.

Thirteen genera are found in the Ethiopian Region. One (*Ploiaria*) is cosmopolitan, one (*Tinna*) is shared with the Palearctic Region, and one (*Bagauda*) is shared with the Oriental Region. Four of the remaining genera are found only on the African continent south of the Sahara, one (*Orthunga*) is African but occurs also on Madagascar, and five are Madagascan endemics. Most of the latter are not very different from certain African genera and can easily be imagined to have shared common ancestors. *Bagauda*, the genus shared by the Ethiopian and Oriental regions, has many cavernicolous species, a fact that may contribute partly to the maintenance of

the relatively large area occupied by the otherwise not vigorous genus under conditions that must have fluctuated considerably in the geological past.

The Oriental and Australian regions possess 11 leistarchine genera, all (with the exception of the ubiquitous *Ploiaria*) rather restricted in range. New Guinea and the Australian continent have only one endemic genus each. The remarkable Australian *Armstrongula* is by far the most plesiomorphic leistarchine. The monotypic *Atisne* is known only from Lord Howe Island; the affinities of this genus are not clear, notwithstanding the erroneous former inclusion (Wygodzinsky, 1956) of its single species in the otherwise purely Madagascan *Nesita*.

The leistarchines have settled on many islands, but the only genus that has established itself on indisputedly oceanic islands is *Ploiaria*, with several native species in such areas as Micronesia (Wygodzinsky and Usinger, 1960) and others, but not on Hawaii. *Ploiaria antipoda* is the only native leistarchine in New Zealand.

The phylogenetic relationships of the leistarchine genera are too poorly understood to allow speculations about possible dispersal patterns, perhaps with the exception of the probably monophyletic group consisting of *Guithera*, *Bagaudella*, *Lethierrya*, *Paraluteva*, and *Pseudobagauda*. *Guithera* occurs in the Oriental Region. The others are southern Palearctic (North Africa) and Ethiopian, with a preponderance of east African forms. Dispersal via the Arabian peninsula in more favorable times of geological history may account for the actual disjunct distribution of these closely related genera.

EMESINI: In this tribe there are two cosmopolitan genera, but their distribution patterns differ slightly in some respects. *Gardena* is highly polytypic and has formed several distinctive species groups, each limited to large but invariably well-circumscribed areas. The most plesiomorphic, the *brevicollis* group, is found in the Oriental and marginally in the Palearctic and Australian regions, as well as in east and south Africa; it is absent from equatorial and west Africa. The *melinarthrum* group is Oriental and Ethiopian, but less restricted in range than the *brevicollis* group. The highly specialized *pipara* group is Neotropical, and the small *longimana* group centers in the Sonoran subregion. There is also a species of unknown affinities in the western Palearctic. The genus has not been recorded from the Antilles, and no assuredly autochthonous *Gardena* has been reported from the Australian continent, but native species are now known from Madagascar, the Seychelles, Micronesia, Fiji, and Samoa. *Stenolemus*, on the other hand, appears to be somewhat more uniform morphologically than *Gardena*. It has native species in all zoogeographical regions, among which are numerous ones in Australia and several on Madagascar, but it is equally absent from the Antilles. In the Pacific, *Stenolemus* reaches Fiji but has not been reported from Micronesia and does not occur farther east. While there are several subcosmopolitan species of disjunct distribution in *Ploiaria* and *Empicoris*, there is none in *Gardena* and *Stenolemus*. This fact indicates that man has played no role in dispersing species of the latter two genera, in which we find no species with peridomestic habits as in some species of *Ploiaria* and of *Empicoris*.

The largest concentration of genera of the Emesini is found in the Neotropical Region, with a total of 11 genera: eight endemic, one (*Stenolemoides*) shared with the Nearctic Region, and two cosmopolitan (*Gardena* and *Stenolemus*). Some genera, such as *Amilcaria* (State of Minas Gerais, Brazil), *Protogardena* (eastern slope of the Andes in Bolivia and Peru), and *Stenolemopsis* (Mexico), seem fairly restricted in range. The apparent disjunct distribution of *Mayemesa* (Paraguay and northern Brazil) probably reflects only insufficient collecting. A more striking disjunct distribution characterizes *Stenolemoides*, with two species in the humid forests around Rio de Janeiro in southern Brazil, and a third in the semiarid southwestern United States and northern Mexico. Four of the five species of *Emesa* occur in Central America and the Caribbean islands. The fifth ranges from Peru to southern Brazil and Paraguay. *Dohrnemesa*, *Phasmatocoris*, and *Polauchenia* are found over most of the Neotropical Region from Middle America to central Argentina. *Phasmatocoris* is unique in its wide morphological as well as ecological spectrum, with greatly diverse species groups and habi-

tats ranging from semideserts to dense rain forest.

No endemic genus of the Emesini exists in the Nearctic and Palearctic regions, but both *Gardena* and *Stenolemus* have native species there, those of the latter genus being rather numerous.

Of the three genera occurring in the Ethiopian Region (in addition to *Gardena* and *Stenolemus*), two (*Eugubinus* and *Myiophanes*) are shared with the Oriental Region, and only one (*Schoutedenocoris*) is an Ethiopian precinctive. Madagascar has been settled by *Gardena*, *Stenolemus*, and *Myiophanes*.

The Oriental Region is equally poor in native genera of the Emesini. Besides the two cosmopolitan genera, there is one endemic (the Bornean *Chinemesa*), one (*Stenolemimus*) belonging to the Papuan subregion and also occurring in Australia, and two (*Eugubinus* and *Myiophanes*) widely dispersed over the Oriental, and also in the Ethiopian, regions; one of the Oriental species of *Myiophanes* occurs marginally also in the eastern Palearctic and in Australia.

Australia is marginal for *Gardena*, but *Stenolemus* is very well developed there. The most extraordinary Australian genus of the Emesini is the endemic *Armstrongocoris*, from New South Wales, unique in the subfamily for its well-developed ocelli. Although *Stenolemus* has reached Tasmania, the tribe Emesini is absent from New Zealand.

No genera of the Emesini are peculiar to oceanic islands, but, as mentioned above, species of *Gardena* and *Stenolemus* are native on some.

The geographical distribution of the Emesini can be briefly summarized as follows: Two genera are worldwide in range, but none of their species is. The largest number of endemic genera (eight) is found in the Neotropical Region and one each in the Ethiopian, Oriental, and Australian regions. Madagascar and several oceanic islands in the Pacific have been settled by the Emesini but only by widespread genera; the species, however, are precinctive.

PLOIARIOLINI: Only one genus (*Empicoris*) has extended its range over all zoogeographical regions with native species. These include Madagascar, New Zealand, and many oceanic islands in the Pacific. Several species of this genus also have apparently been carried by man beyond their original range.

The Ploiariolini are poorly developed in the Neotropical Region in number of genera. *Emesopsis* is represented by only a single, and very probably introduced, species. The cosmopolitan *Empicoris* has developed a large number of species and is here by far the most common genus of the tribe. Two introduced species (the otherwise holarctic *culiciformis* and the almost cosmopolitan *rubromaculatus*) are found in the Patagonian subregion. Two of the three native Neotropical genera (*Malacopus* and *Panamia*) range from the Caribbean to southern Brazil and form a monophyletic group with *Ademula* of the tropics of the Old World. The third Neotropical endemic (*Hybomatocoris*) is restricted to the semiarid mediterranean zone of central Chile. Its relationships are not clear, though in some respects it resembles *Sepimesos* of Madagascar and *Mesosepis* of New Guinea.

The only Nearctic and Palearctic genus of the Ploiariolini is *Empicoris*, with many native species.

In addition to the ubiquitous *Emesopsis nubilus*, Africa possesses three genera, one cosmopolitan (*Empicoris*) and two (*Ademula* and *Calphurnioides*) shared with the Oriental and Australian regions. The species of *Empicoris* are many, but only two of *Calphurnioides* and two of *Ademula* are known from Africa. The actual center of speciation of these genera is situated in the Oriental and Australian regions.

Madagascar has, in addition to several species of *Empicoris*, at least three of *Ademula* and one of *Calphurnioides*, as well as one endemic ploiarioline genus (*Sepimesos*) apparently closely related to *Mesosepis* from the Australian Region.

In the Oriental Region, the Papuan subregion occupies a special position in respect to the Ploiariolini: it harbors the only endemic Oriental genus, the highly specialized *Bironiola* of New Guinea, as well as *Mesosepis*, the only genus not occurring in any other part of the Oriental Region but shared with Australia. All other Oriental ploiarioline genera inhabit much more extensive portions of this region: *Empicoris* is worldwide, *Emesopsis* and *Tridemula* are found in the Australian

Region, and *Ademula* and *Calphurnioides* occur in the Australian as well as the Ethiopian regions. All these genera, except for *Calphurnioides*, are also found on many oceanic islands of the Pacific.

There is no endemic ploiarioline genus in the Australian Region. In addition to the cosmopolitan *Empicoris*, there are *Ademula*, *Calphurnioides*, *Emesopsis*, *Mesosepis*, and *Tridemula*, all with a profusion of species, in the Papuan subregion. They do not go beyond Queensland toward the south and are thus obviously Torresian elements. *Empicoris* does reach New South Wales and Tasmania. It is also the only ploiarioline genus in New Zealand, where it has evolved specialized forms.

The Ploiariolini constitute an important element on the Pacific islands. Of the eight genera occurring there with precinctive species, one (*Empicoris*) is cosmopolitan and three are very well developed in the Australian Region and, especially, the Oriental Region. One (*Calphurnioides*) ranges as far as the Ethiopian Region. But none, with the exception of *Empicoris*, has endemic species in the New World. The remaining four genera are all island endemics: *Ctydinna* on Samoa, *Calphurniella* on Fiji, and *Nesidiolestes* and *Saicella* in the Hawaiian Islands. The last two genera, each with a different species on each of at least three of the large islands of the group, differ from all other known members of the Ploiariolini by their brachypterous (*Saicella*) or apterous (*Nesidiolestes*) condition. *Saicella* has furthermore retained unique plesiomorphic characteristics, such as the presence of spines on the under side of the head, on the rostrum, and on the fore coxae. A third unusual Hawaiian ploiarioline is *Empicoris whitei*, an endemic species differing from all congeneric ones by the presence of conspicuous wool-like pile similar to that found in *Emesopsis*, and the retention of a spine on the fore coxa, interpreted here as preservation of a plesiomorphic feature.

DELIASTINI: This tribe is restricted to the Neotropical Region. *Palacus* occurs on the Caribbean islands as far north as the Bahamas, *Stalemesa* has been found only near Rio de Janeiro in southern Brazil, but the third genus (*Bergemesa*) extends from central Argentina and Chile over Bolivia to Peru. The restricted range of the tribe is in agreement with its character as the relict plesiomorphic component of the Deliastini-Metapterini group; the apomorphic component is much better developed and widely dispersed.

METAPTERINI: All zoogeographic regions of the world possess endemic genera of this tribe, the distribution pattern of which shows several peculiarities. First, there is no cosmopolitan genus, or even one shared by the Western Hemisphere and some portion of the Old World. Second, there are two truly endemic Palearctic genera (*Metapterus* and *Ischnonyctes*), but, quite unlike the other Palearctic precinctive (the leistarchine *Lethierrya*), they lack clear-cut Ethiopian affinities. The presence of these genera in the western Palearctic indicates their tolerance of relatively low temperatures, a phenomenon also shown by the occurrence of native species of other genera of the tribe in such cool temperate areas as northern North America, Tasmania, and the Patagonian subregion of southern South America, whence few or no other native emesines have been reported. Third, there is only a single genus shared by the Ethiopian and Oriental regions. Fourth, there is a disproportional number of monotypic island genera (seven out of 27), two on subcontinental islands (Jamaica and Ceylon), and five on oceanic islands in the Pacific (Norfolk Island, Fiji, and Tubuai in the Austral Islands, the latter with three endemic genera). Finally, the distribution of metapterine genera over the various zoogeographical regions and the oceanic islands of the Pacific is more uniform than that of the other large tribes, as shown in figure 16.

The largest number of metapterine genera (seven) is found in the New World. Only one (*Emesaya*) is equally well developed both in the Nearctic and Neotropical regions, with native species from the United States south to northern Argentina. *Barce* is a mainly Nearctic genus, though it has a species restricted to Cuba, and one North American species extends into the Neotropical Region as far south as the Caribbean and Colombia. Significantly, none has been reported from the east coast of South America. *Pseudometapterus* has two endemic species in the extreme south of the United States, but the center of diversity of the genus is in South

America. Native species of this genus occur in the forests of the Patagonian subregion in southern South America and on the Juan Fernández Islands. The continental species belongs to a wide-ranging South American species group, but the ones from Juan Fernández form their own species group. The four almost exclusively Neotropical genera (*Ghilianella*, *Ghinallelia*, *Liaghinella*, and *Emesella*) are all closely related; their ranges are quite different. *Ghilianella* occupies an extensive area of humid forests in tropical South and Central America; one subgenus (*Ploeodonyx*) has entered the Lesser Antilles (Windward Islands) from northeastern South America. The more wide-ranging *Ghinallelia* occurs from northern Argentina to Florida and Alabama, though no endemic species is found in North America. The genus is apparently absent from Central America, but has radiated considerably in the Caribbean islands. It has in some instances become adapted to arid conditions, such as on the Pacific coast of Peru, and has even reached the Galápagos Islands. *Liaghinella* and *Emesella* occupy much smaller areas. The former is restricted to Jamaica; the latter, to higher elevations in the Andes, from Bolivia to Colombia.

The two endemic Palearctic genera (*Metapterus* and *Ischnonyctes*) are restricted to the western portion of that region. That there is no endemic genus in the eastern portion may be due to the absence of an efficient climatic barrier separating it from the Oriental Region, unlike that between the western portion of the Palearctic and the Ethiopian regions, which makes faunal interchange more difficult.

Schidium has a considerable number of species in the Ethiopian Region, including Madagascar, and in the Oriental Region. The wide-ranging *Schidium marcidum* also occurs in the eastern portion of the Palearctic Region and in Australia. The remaining four Ethiopian genera, all precinctive, show various dispersal patterns. *Jamesa*, a very closely knit assemblage of species, is mainly west and central African, a few species attain Mozambique, but none has been found on Madagascar. *Leptinoschidium* is west and central African, but one species has been reported from Madagascar. *Bobba* is absent from the humid forests of west and central Africa; it is restricted to semiarid areas of east and South Africa and of Madagascar. *Berlandiana* is endemic on Madagascar, where it has speciated considerably.

The Oriental genera *Ischnobaena* and *Ischnobaenella*, closely related to each other, seem to be geographical vicariants: *Ischnobaena* is found only in the Philippines, and *Ischnobaenella* extends from India and Ceylon to southern China, Malaya, and Sumatra. *Onychomesa* is known only from what are probably the extremes of its total range, viz., central India and the island of Formosa. *Hornylia* has been collected only on Ceylon.

Only one metapterine species, which is nonendemic, has been reported from New Guinea, though the tribe has numerous genera and species in many parts of the Oriental Region, in Australia, and on various Pacific islands. This distribution is remarkable when it is considered that all the three other large emesine tribes have several endemic species and two even precinctive genera in New Guinea. An explanation for the virtual absence of the metapterines from New Guinea may be found in the fact that most of these insects are adapted to life in open country and often exposed or semiarid conditions, which do not abound in the lower situations of New Guinea. The only New Guinea metapterine (*Schidium marcidum*), also reported from New Ireland, has probably a more ample ecological spectrum than many other metapterines, as implied by its extensive range, from Japan and China to Ceylon and New South Wales.

Three metapterine genera have been found on the Australian continent. *Anandromesa* is known only from a single species in northwest Australia. *Pseudobargylia*, the dominant Australian genus, is heavily concentrated in Tasmania and New South Wales, but occurs also elsewhere, including Lord Howe Island, though it has not been recorded from Western Australia. *Bargylia* has not been reported from either New South Wales or Tasmania. No metapterine species exists on New Zealand.

All five endemic genera on the oceanic Pacific islands are monotypic, and all occur in the southern Pacific. *Leaylia* is found on Norfolk Island, *Nandariva* is Fijian, and the remaining three (*Pelmatomesa*, *Tubuataita*,

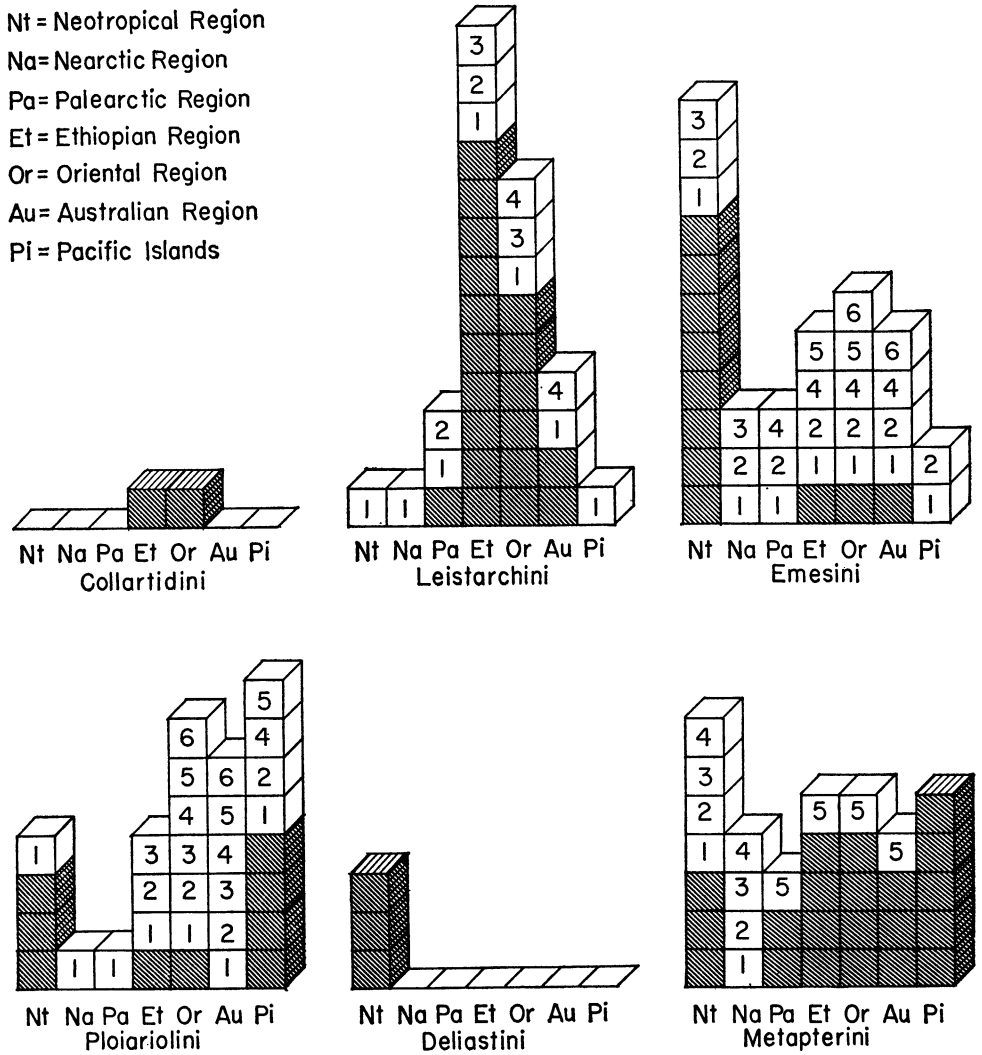


FIG. 16. Geographical zoology of the tribes and genera of the Emesinae. Each genus is represented by a cube. Hatched cubes represent genera restricted to one region; white cubes represent non-endemic genera, numbered individually to show their range.

and *Taitaia*) all occur on minuscule (approximately 14 square miles) Tubuai in the Austral Islands. The three last-named genera are very different from one another and obviously the descendants of three different immigrants; at least two, *Tubuataita* and *Taitaia*, are among the morphologically most aberrant of the Emesinae. One is tempted to see here the result of random fixation of nondetrimental alleles in originally or actually very small populations, under conditions of extreme isolation and absence of competition or other selective factors. The relationships and, by implication, the probable routes of immigration of *Pelmatomesa* and *Taitaia* are not known. *Tubuataita* may have shared a relatively recent common ancestor with *Leaylia* of Norfolk Island.

The number of genera in each tribe, in the various zoogeographical regions and on the oceanic islands of the Pacific, as defined above, is shown in figure 16.

ZOOLOGICAL GEOGRAPHY OF THE EMESINAE

Although some repetition may be unavoidable, I believe that it is desirable to add here a short survey of emesine distribution from a

geographical rather than a taxonomic point of view.

The main division of the emesine fauna of the world is into a New World and an Old World subfauna. These two areas share no genera beyond the cosmopolitan *Ploiaria*, *Gardena*, *Stenolemus*, and *Empicoris*. Within each of the above subfaunas, zoogeographical regions do share a certain number of genera. In addition to the cosmopolitan ones, five genera are common to the Nearctic and Neotropical regions; six, to the Ethiopian, Oriental, and Australian regions; nine, to the Oriental and Australian regions; three, to the oceanic Pacific islands, the Oriental and Australian regions; and three, to the Palearctic Region and the Old World tropics.

There are significant differences also, on the tribal level, between the emesine fauna of the Old World and that of the Western Hemisphere. Each subfauna has a tribe not present in the other—the Collartidini in the Old World tropics and the Deliastini in the Neotropical Region. The differential development of the larger tribes in the Old World and the New World is also remarkable. The largest number of genera of the Emesini is found in the New World, where the Leistarchini are very poorly developed, whereas they are most abundant in the Ethiopian and Oriental regions, where there is a much lower representation of the Emesini. The actual center of generic abundance of the Ploiariolini is in the Pacific and the subcontinental islands of the Oriental Region. The Metapterini are somewhat more evenly distributed, with roughly equal numbers of genera in each of the zoogeographical regions and the oceanic islands of the Pacific.

The foregoing data indicate the existence of two large centers of emesine evolution—the tropics of the Old World and of the New World. By late Mesozoic times, the tribes Emesini, Ploiariolini, and Metapterini must have existed and must have become dispersed over the two great land masses. The predominantly cooler climate of the northern lands must have made exchange of the thermophilous Emesinae between the Old World and the Western Hemisphere very difficult at a later time. The climatic barrier between the two centers has been bridged by only the four cosmopolitan genera, many species of which have been able to adapt to cooler climates.

Fossil evidence for former emesine distribution is meager and does not contribute toward an understanding of modern faunas. Bachofen-Echt (1949) illustrated an undetermined nymph from Baltic amber which cannot be placed taxonomically. I have seen a species of *Empicoris* in amber from Chiapas, Mexico, of approximately Middle Miocene age, not yet identified, which does not differ in any way from Recent species of this cosmopolitan genus.

The Nearctic and Neotropical regions are closely related from the standpoint of emesine distribution. There are no precinctive Nearctic genera; the nine genera found in the Nearctic Region consist of the four cosmopolitan ones and five shared with the Neotropical Region. Except for a few introduced species of *Ploiaria* and *Empicoris*, all Nearctic species of the cosmopolitan genera are autochthonous. Of the five exclusively New World genera occurring in the Nearctic Region, only one (*Barce*) has its actual center of speciation there, with one native species in Cuba and another ranging from the United States to the west coast of South America. *Emesaya* is equally well developed in North, Central, and South America; *Pseudometapterus*, a mainly Neotropical genus, has two North American species in the south of the United States; *Stenolemoides* has a disjunct distribution, in the southwestern United States and in southeastern Brazil; and the Neotropical *Ghinallelia* enters Florida and Alabama with an Antillean species.

The absence of precinctive emesine genera in the Nearctic contrasts with the presence of 17 genera restricted to the Neotropical Region. Many factors could be responsible for this unequal distribution. The presence of a large land mass of varied topography situated in the warm climate preferred by the Emesinae has presumably been the prime factor for the development and continued existence of these genera there.

Within the Neotropical Region, different genera have different ranges: some are restricted to very small areas, some occupy wider areas, and several are found from Central America and the Antilles to southern South America.

The South American continent has the largest number (seven) of endemic genera, all of which have very restricted ranges.

Hybomatocoris is found only in central Chile; *Bergemesa*, in the semiarid regions of western South America. *Emesella* is restricted to the higher portions of the Andes from Bolivia to Colombia; *Protogardena*, to the tropical eastern slopes of the same area; and *Amilcaria*, *Mayemesa*, and *Stalemesa* occupy restricted ranges in the humid tropical forests of the eastern portion of the continent. All genera mentioned are morphologically or ecologically specialized and are known from one or two species only, with the exception of *Bergemesa*, which has become the dominant emesine genus in the semiarid regions it inhabits. Other genera occurring in South America extend to Central America (*Dohrnemesa*, *Emesa*, *Phasmatocoris*, and *Polauchenia*), or to Central and to North America (*Emesaya*, *Pseudometapterus*, *Ghilianella*). The disjunct distribution of *Stenolemoides*, mentioned above, covers southern Brazil and the southwestern United States. The only Central American precinctive is *Stenolemopsis;* its affinities are with *Stenolemoides*, and its origin may be Sonoran rather than Neotropical.

The preceding survey does not take into account the four cosmopolitan genera, all of which have native species in South, Central, and North America.

The emesine fauna of the Antilles is noteworthy. There are two precinctive genera: the deliastine *Palacus* (possibly closer to the Brazilian *Stalemesa* than to *Bergemesa* of western South America) is found from the Bahamas to Cuba and Jamaica, and the metapterine *Liaghinella* (possibly derived from a *Ghilianella*-like ancestor) has been encountered only in Jamaica. *Dohrnemesa* and *Ghilianella* are found in the Lesser but not in the Greater Antilles. The hypothesis of over-water dispersal from northwestern South America seems reasonable, especially in the case of the Antillean species *Ghilianella angulata* (St. Vincent; Grenada), which belongs to the subgenus *Ploeodonyx*, otherwise restricted to the Guianas and the Amazonian area. *Ghinallelia*, found in the Lesser and Greater Antilles and in the Bahamas, seems to be completely absent from Central America, but one species, also occurring on Cuba, has reached the southern United States; the genus, also found in the Galápagos Islands, is widespread over South America but is especially abundant in Venezuela and Colombia. It concentrates heavily in semiarid regions, the scarcity of which in the portion of Central America adjoining the South American continent may explain the absence of *Ghinallelia* from Middle America. The remaining West Indian emesine genera, all found in the Greater and occasionally also in the Lesser Antilles, are rather widespread. *Emesopsis* is represented by a single introduced tropicopolitan species. *Malacopus* and *Panamia* have additional species in Central and South America. *Emesa* has three species in the Antilles, one in Central America, and one in South America, the last ranging from Peru to southern Brazil. The otherwise North American *Barce* has one precinctive species in Cuba; a northern origin of this species is apparent.

The most extraordinary phenomenon concerning emesine distribution in the West Indies concerns the four cosmopolitan genera. *Ploiaria* has here about eight precinctive species and at least three additional, more widespread species. All five species of *Empicoris* recorded from the Antilles occur also in North, Central, or South America, but *Gardena* and *Stenolemus* have never been found in the West Indies at all. Neither climate nor inadequate mechanisms of dispersal can account for the absence of *Gardena* and *Stenolemus* from the Antilles; both genera have attained and successfully settled subcontinental and even oceanic islands in other parts of the world. As long as almost nothing is known about the ecology of these insects, it is futile to theorize further about this highly anomalous aspect of the emesine distribution pattern in the West Indies, though the presence of a relatively high number of endemic species of *Ploiaria*, a genus anything but dominant in most of the New World, suggests the role competition may have played in the genesis of the actual composition of the West Indian emesine fauna.

The peculiar position of the humid cool-temperate zone of southern Chile and Patagonia, unrelated biogeographically in many respects to the rest of South America, has been recognized by many authors. It is characterized, among other features, by the presence of certain elements shared with

portions of the Australian and Oriental regions, as well as by the absence of many of the more frequent components of the Neotropical fauna and flora. This latter fact may be explained by the isolation and unfavorable climatic conditions of what Kuschel (1963) called the Patagonian subregion. He even suggested tentatively that this area, together with other southern areas of comparable biota, might form a new (the Austral) region. There is no endemic reduviid genus in the Patagonian subregion, and no native genus shared with any other portion of the Southern Hemisphere. As a matter of fact, there is no true south-temperate reduviid genus in any part of the world. There are only two precinctive reduviids in the mainland portion of the Patagonian subregion, one of them belonging to the Emesinae, the metapterine *Pseudometapterus kuscheli*, which belongs to a species group otherwise found in eastern Argentina and in Brazil. Two introduced emesines (*Empicoris culiciformis* and E. *rubromaculatus*) also occur in the Patagonian subregion. On the archipelago of Juan Fernández, which is also a part of the Patagonian subregion, the only reduviids are emesines: two introduced (*Ploiaria chilensis* and *Empicoris rubromaculatus*) and three endemic species, all belonging to *Pseudometapterus* and forming a species group of their own. From the standpoint of emesine distribution, the affinities of Juan Fernández lie clearly with South America.

With 10 emesine genera, the Palearctic Region is almost as poor as the Nearctic, but, unlike the latter, it has precinctive genera (three). Of the remainder, four are the ubiquitous cosmopolitans, one (*Tinna*) is shared with the Ethiopian Region, and two are common to the Ethiopian and Oriental regions (*Myiophanes* and *Schidium*, respectively). The eastern and western portions of the Palearctic Region differ considerably in their emesine fauna. The western portion, comprising Europe, Africa north of the Sahara, and the Near East, harbors all three endemic genera, *Metapterus*, *Ischnonyctes*, and *Lethierrya*, the last-named with Ethiopian affinities. *Tinna*, represented in North Africa with several endemic species, has its main center of diversity in the Ethiopian Region. The non-precinctive genera are best developed in the Mediterranean subregion, with the only Palearctic species of *Gardena* and numerous species of *Empicoris*, *Stenolemus*, and, especially, *Ploiaria*. From the eastern portion of the Palearctic Region (Japan and northern China), *Ploiaria* and *Stenolemus* have not been recorded. *Gardena* is represented there, with two species extending into several other regions, and *Empicoris* has one cosmopolitan species (*rubromaculatus*) and one (*brachystigma*) which seems to be the only member of the Emesinae endemic to the eastern portion of the Palearctic Region. The two other emesine genera found in this area are *Myiophanes* and *Schidium*, each with one species ranging over large parts of the Oriental Region and as far as Australia. The lack of a distinct fauna of the Emesinae in the eastern part of the Palearctic Region is also characteristic of other groups of animals. The intimate biogeographical relations of this area with the Oriental Region are obvious, just as the western portion of the Palearctic is somewhat associated with the Ethiopian Region.

Out of a total of 28 emesine genera in the Ethiopian Region, the number of endemics (17) is almost as high as for those in the Neotropical Region, but the composition of the fauna is very different. The most striking feature is the dominance of leistarchine genera, 11 precinctive and two shared with other regions, as opposed to the eight precinctive and three shared genera of Emesini in the Neotropical Region.

Madagascar has 17 genera, of which seven are precinctive. As in the Ethiopian Region as a whole, the Leistarchini have a larger share among the endemic genera than any other tribe: there are five compared to one precinctive ploiarioline and one metapterine. Three of the leistarchine precinctives (*Millotina*, *Nesita*, and *Bettyella*) are closely related to other Ethiopian genera. The rather plesiomorphic *Tinnatunga* and *Tinnunga*, resembling the equally primitive Australian *Armstrongula* (this symplesiomorphic resemblance does not imply close relationship), may be the descendants of relatively ancient immigrants belonging to a stock now mostly extinct. These genera are not significant for any judgment on zoogeographical affinities. The ploiarioline *Sepimesos* resembles somewhat the Papuan *Mesosepis* and the central

Chilean *Hybomatocoris*, but the relationships of these genera are not well understood. The metapterine *Berlandiana* is in some respects more similar to certain Oriental than to African genera, but here again our knowledge is insufficient to support a hypothesis of biogeographical relationships between Madagascar and the Oriental Region. Among the nonprecinctive genera, evidence points to Ethiopian and not to Oriental connections. All three cosmopolitan genera found in Madagascar (*Gardena*, *Stenolemus*, and *Empicoris;* the absence of *Ploiaria* is remarkable), have autochthonous species, but before their relationships with other species of these large genera are fully understood, their value for biogeographical interpretation is limited. *Myiophanes* has an endemic subgenus on Madagascar (*Perimyiophanes*) which seems to share some derived characters with the Oriental subgenus *Myiophanes* (*Myiophanes*) and some with the Ethiopian subgenus *Myiophanes* (*Paramyiophanes*); its biogeographical significance cannot yet be appreciated. *Ademula*, *Calphurnioides*, and *Schidium* are wide-ranging Paleotropical genera, but at least the species of the Madagascan *Schidium* are more closely related to the Ethiopian than to the Oriental species. The three remaining genera (*Orthunga*, *Bobba*, and *Leptinoschidium*) are exclusively Ethiopian. No past land connection between Madagascar and Africa need be postulated to account for the presence on the island of seven endemic genera and 10 genera shared with Africa. On the much lesser known but certainly oceanic islands of the Pacific, a total of 16 genera of the Emesinae have been collected until now, nine of which are precinctive. If a group of insects is able to attain and successfully settle widely scattered oceanic islands of generally small area, it is to be supposed that these insects will experience no greater difficulties in reaching and colonizing an island such as Madagascar, much closer to a continental land mass and much larger and more varied.

Twenty-nine genera of the Emesinae are found in the Oriental Region (excluding the oceanic islands of the Pacific); 13 are endemic, viz., six leistarchines, four metapterines, and one collartidine, one emesine, and one ploiarioline. The distribution of the precinctive genera is remarkable, because their great majority (nine) occur only east of Weber's line. One (the leistarchine *Gomesius*) is found in southeast Asia, in Indonesia, and on New Guinea, and only two are restricted to the Papuan subregion.

The emesine fauna of New Guinea and adjacent islands is composed of the above-mentioned endemics, viz., the leistarchine *Mafulemesa*, the ploiarioline *Bironiola*, and 12 shared genera. All four cosmopolitans occur on New Guinea. *Ploiaria* has speciated considerably; though there are some taxonomically isolated species, most (to a great extent still undescribed) belong to a few typically Oriental, wide-ranging species groups. There are some precinctive species of *Stenolemus*, but no species of the few native *Gardena* and *Empicoris* is endemic to New Guinea. Of the remaining seven genera, two (*Stenolemimus* and *Mesosepis*) are shared with Australia, three (*Gomesius*, *Emesopsis*, and *Tridemula*) occur also in other parts of the Oriental Region, with the last two genera attaining certain oceanic islands of the Pacific, and two (*Calphurnioides* and *Eugubinus*) are found not only in other areas of the Oriental Region but also in the Ethiopian Region. All the foregoing six genera have precinctive species in New Guinea, but *Schidium marcidum*, the only representative of the Metapterini, is a wide-ranging species that occurs from Japan to Australia. The possible reasons for the virtual absence of the tribe Metapterini from the Papuan subregion are discussed above.

An analysis of the foregoing data shows the basically Oriental character of the New Guinean emesine fauna: there are two endemic genera, two shared with the Australian Region, where they represent Torresian elements, three genera that are entirely Oriental, and all the others have species of Oriental relationships, in instances in which their affinities can be established at all.

Special mention must be made of the emesine fauna of New Caledonia. To judge from the evidence available, there are no precinctive genera there, and only *Ploiaria* and the emesine *Eugubinus* have autochthonous species. One of the species of *Ploiaria* is known from an inadequate description. The two others, closely related, belong to a species group that is widespread in the Oriental Region and reaches Micronesia and Fiji in the

Pacific. The presence of *Eugubinus* marks the eastern outpost of the genus, which ranges over the Oriental Region and attains the Ethiopian Region. One of the New Caledonian species is unremarkable; the other one is highly apomorphic, suggesting a considerable degree of former isolation. The apparent poverty of emesine genera on New Caledonia, as compared, for instance, with those in the Fiji Islands, with two precinctive genera and endemic species in at least four additional genera, is notable. Gressitt (1961) said in this regard, "New Caledonia holds a position by itself and cannot be strictly classified as oceanic or subcontinental." The data on the Emesinae of New Caledonia presently at hand contribute nothing toward dispelling the doubts expressed by Gressitt.

The Australian Region has 19 genera of the Emesinae. Six are endemic, and one of these, the leistarchine *Atisne*, is restricted to Lord Howe Island. Three endemic metapterine genera in Australia make this tribe the one with the largest number of precinctive genera; the other continental endemics are the leistarchine *Armstrongula* and the emesine *Armstrongocoris*. Several of the Australian endemics show striking plesiomorphic characters: *Armstrongocoris* is the only emesine with ocelli, *Pseudobargylia* is one of the few (but not the only) metapterine that has retained segmented fore tarsi, and the leistarchine *Armstrongula* is in many respects the most plesiomorphic genus of its tribe. Among the 13 genera not restricted to the Australian Region, we find the four cosmopolitan ones, all (except *Gardena*) with numerous autochthonous species. The Australian species of *Gardena* (*brevicollis*) is also found in the Oriental Region, as is the only species of *Schidium* (*marcidum*) occurring in Australia, but all other genera shared by the Australian Region and the Oriental Region and in most cases also additional regions have produced endemic species. The Ploiariolini, with six genera occurring in Australia, is the largest tribe there, but none of the genera is precinctive.

Cool-temperate Tasmania harbors only four emesine genera: the cosmopolitan *Ploiaria*, *Stenolemus*, and *Empicoris*, all with species also found on the mainland, and the Australian *Pseudobargylia*, with a closely knit group of three species, one of which has also been recorded from southern Australia. On New Zealand only *Empicoris* and *Ploiaria* have been found. Though there are introduced species of both genera (*Empicoris rubromaculatus* and *Ploiaria chilensis*), there are also autochthonous species. The species of *Empicoris* in New Zealand have diverged morphologically to some extent from the main stock of the genus, but they have not been studied in detail. The only endemic *Ploiaria* (*antipoda*), restricted to the North Island, is also rather apomorphic but is clearly allied to a group of Oriental species.

Lord Howe Island is here included in the Australian Region, though Gressitt (1961) has shown that it may not be possible to assign the island unequivocally to one of the conventional regions or subregions so as to agree with the evidence obtained from all groups of plants and animals that occur on the island. One of the four emesine species of Lord Howe Island is the cosmopolitan *Empicoris rubromaculatus*. *Pseudobargylia leai*, also found there, belongs to an otherwise exclusively Australian genus, but the species is conspicuously apomorphic, a fact that indicates a relatively high degree of isolation. *Tridemula metabates* occurs on Lord Howe and also in Queensland. The relationships of the endemic genus *Atisne* are not known but are definitely tropical and not south temperate.

As mentioned above, the Emesinae constitute the great majority of all the Reduviidae present on the oceanic Pacific islands, a ratio very different from that of continental areas. In Micronesia, for instance, 20 of the 30 reduviid species belong to the Emesinae. On certain more westerly archipelagos, such as the Austral Islands, Hawaii, and Juan Fernández, the Emesinae constitute the only native reduviids. Collecting has been too sporadic to give us an approximately complete picture of emesine distribution in the Pacific, but man is destroying the native flora and fauna at such an accelerated rate in many parts of the Pacific that the following summary may never require much revision.

There are 16 genera of the Emesinae on the oceanic islands of the Pacific; nine are not found elsewhere, viz., four ploiarioline and five metapterine genera. The ratio of the dif-

ferent tribes on the islands (not including Galápagos and Juan Fernández, which belong to the Western Hemisphere) is quite different from that of continental and subcontinental areas. The leistarchines are represented only by *Ploiaria*, with several very wide-ranging as well as autochthonous species belonging to two typical Oriental species groups that have not been found farther west than the Caroline Islands of Micronesia and Fiji, though a very apomorphic species occurs on New Zealand. The oceanic Pacific species of the Emesini belong to *Stenolemus* and *Gardena*. The only species of *Stenolemus* occurs on Fiji, with its nearest relatives in the Papuan subregion, whereas there are three species of *Gardena*, one in the Caroline Islands, one on Samoa, and one common to Samoa and Fiji. The tribe Ploiariolini has by far the largest number of genera. Four range widely, with autochthonous species in Micronesia and on Fiji, and four are precinctive: one on Fiji, one on Samoa, and two on the Hawaiian Islands. There are five metapterine genera, all precinctive: one on Norfolk Island, one on Fiji, and three on Tubuai in the Austral Islands.

Micronesia has six genera of the Emesinae, with 20 species; 16 of these, mostly in the Ploiariolini, are endemic and confined generally to single islands or small island groups. Except for the wide-ranging *Ploiaria insolida*, all species are restricted to the high islands (Wygodzinsky and Usinger, 1960). The relationships of the Micronesian emesines are clearly Oriental. The largest number of species (13) has been collected in the Caroline Islands. The Mariana Islands have five, and the Bonin and Marshall Islands one species each, but the latter are widespread and not Micronesian precinctives.

Norfolk Island has only one precinctive emesine genus, the monotypic metapterine *Leaylia;* its affinities are not known.

Gressitt (1961) stated that "Fiji has a rather rich fauna indicating speciation over a considerable period." As to the Emesinae, Fiji is certainly much richer than Samoa or New Caledonia, but each of the eight genera extant is known from a single species only. If it is considered that two of the genera are precinctive, one is obliged to conclude that, at least for the Emesinae, there has been isolation, but conditions have not been so favorable for speciation as, for instance, in the Hawaiian Islands. In this connection it may be noted here that Fiji and Samoa possess the only two precinctive genera of the Emesinae on an oceanic Pacific island with fully winged species, viz., the ploiariolines *Calphurniella* and *Ctydinna*. All other genera on oceanic Pacific islands have species without, or with very strongly reduced, wings. Reduction or loss of wings seems to be a general rule for emesines exposed to extreme conditions (such as are found in deserts, places of very high humidity, high altitudes, or those connected with islands, such as small area). It seems that extreme conditions responsible for wing loss either do not affect *Calphurniella* and *Ctydinna* or have had no opportunity to do so, because of the relatively recent isolation of the genera or their immediate progenitors on the islands. Fiji is also noteworthy for representing the most eastern locality for the genus *Stenolemus*, and at the same time the only oceanic island where the genus is found.

The Samoan emesine fauna is not impressive. Of the six species found, three (*Empicoris minutus*, *E. rubromaculatus*, and *Ploiaria insolida*) range widely in the Pacific; one (*Gardena pacifica*) is shared with Fiji; one (*Gardena geniculata*) is an endemic species; and one (the ploiarioline *Ctydinna nitidicollis*) constitutes the only precinctive genus, the affinities of which have not been established in detail.

In southeastern Polynesia a single species (the cosmopolitan *Ploiaria macrophthalma*) has been recorded from Tahiti, and two (the widespread *Ploiaria insolida* and the apparently endemic *P. assimilata*) come from the Marquesas. Tubuai in the Austral Islands possesses three precinctive monotypic metapterine genera (*Pelmatomesa*, *Taitaia*, and *Tubuataita*). I do not believe that Tubuai is a special haven for the Emesinae. There is no reason to believe that collecting on other high islands in southeastern Polynesia may not produce comparable elements.

The Hawaiian Emesinae follow a pattern typical for many insects in this archipelago: extreme disharmony in the faunal composition, viz., only one tribe (the Ploiariolini) with native taxa derived from a small number

of successful immigrants (probably only three) and, at least in two of the three lineages, evolution of a chain of closely related species, each restricted to one of the larger islands. For *Nesidiolestes*, one species has been described each from Oahu, Kauai, and Hawaii; and, for *Saicella*, one each from Maui and Kauai. One of the precinctive genera (*Nesidiolestes*) is rather specialized, but *Saicella* has retained such a large share of plesiomorphic characters that it was described originally (Usinger, 1958) as a mem-

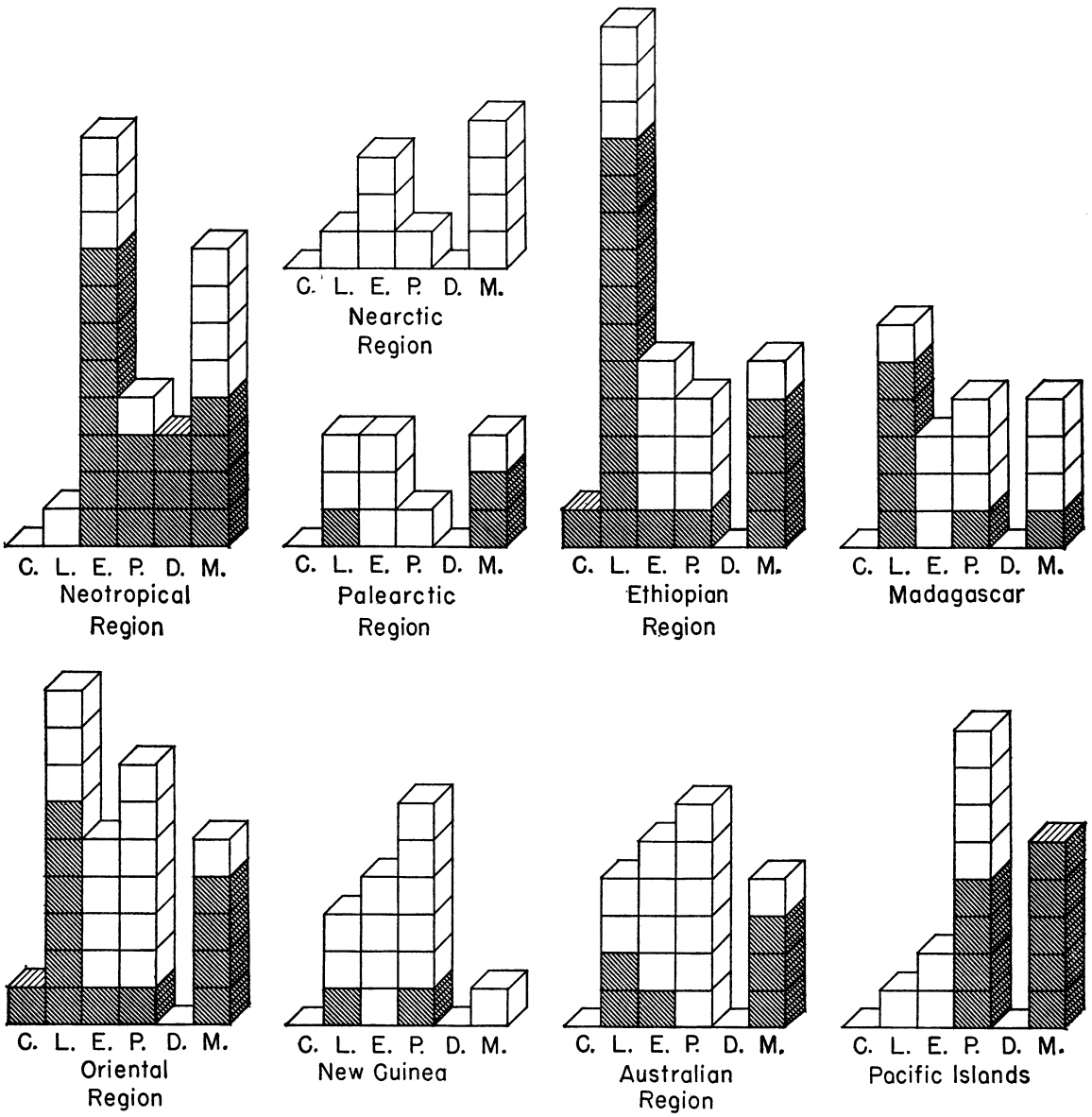


FIG. 17. Zoological geography of the tribes and genera of the Emesinae. Each genus is represented by a cube. Hatched cubes represent genera precinctive to the respective region or subregion; white cubes represent non-endemic genera. Genera figured for Madagascar also included in graph for Ethiopian Region, and genera figured for New Guinea also included in graph for Oriental Region.

Abbreviations: C, Collartidini; D, Deliastini; E, Emesini; L, Leistarchini; M, Metapterini; P, Ploiariolini.

ber of the subfamily Saicinae, the plesiomorphic branch of the Saicinae-Emesinae assemblage. The other sufficiently known endemic of Hawaii (*Empicoris whitei*) has retained a larger number of plesiomorphic features than any other known species in the genus. This relative abundance of primitive forms incites speculation about the time of arrival of their ancestors on what is now the Hawaiian archipelago, but our present state of knowledge of the Emesinae makes any such speculation unrealistic. Another Hawaiian species of *Empicoris* (*pulcher*) is imperfectly known, and the two remaining species (*minutus* and *rubromaculatus*), as well as the other Hawaiian emesines (*Ploiaria insolida* and *P. macrophthalma*), range over large parts of the world and are probably recent immigrants. *Saicella* and *Nesidiolestes* are not closely related to each other, and their relations to the other genera of the tribe have not been worked out; consequently it is not possible to express opinions on their geographical relationships.

Figure 17 shows the quantitative composition of the emesine faunas, on the tribal and generic levels, for all zoogeographical regions and some subregions, and for the oceanic islands of the Pacific.

SYSTEMATICS

EMESINAE Amyot and Serville

Emesides Amyot and Serville, 1843, p. 393.
Emesoidea Spinola, 1850a, p. 45 (as subfamily).
Ploiariina Costa, 1852, p. 66.
Emesina Dohrn, 1859, p. 52.

Description: Slender and elongate Reduviidae of approximately cylindrical body shape. Micropterous and apterous forms frequent.

Eyes invariably present. Ocelli absent (except *Armstrongocoris*). Interocular furrow present. Rostrum three-segmented. Third antennal segment in many cases very short.

Pronotum of winged form from simple to elongate-pedunculate. Anterior acetabula opening forward. Forelegs raptorial. Fore coxa elongate. Fore femora invariably, and fore tibiae generally, with series of spinelike setae or variously shaped spiniferous processes. Fore tibiae (invariably?) with one pair of sensory elements. Fore tarsi with one, two, or three segments; if more than one-segmented, basal segment not the shortest (except Collartidini). Claws of all legs variously modified (except Collartidini and Leistarchini). Forewings entirely membranous, with one, two, or three closed cells; pterostigma extending beyond apex of discal cell. Hind wing with hamus.

Dorsal abdominal scent-gland openings absent. Male genitalia varied in structure; parameres invariably present; phallus in some cases asymmetrical. Female genitalia with all sclerites developed; posterior gonapophyses fan-shaped; third gonapophyses fused, forming a syngonapophysis (except Collartidini and some Leistarchini).

Testes asymmetrically arranged. Mesadenia each composed of one or two lobes.

Chorion of eggs covered with variously structured longitudinal ridges formed by cement.

Type Genus: *Emesa* Fabricius.

Observations: The very long and slender legs and antennae of the Emesinae (pls. 1–4) distinguish them from almost all others of the Reduviidae except some of the Saicinae, a closely related subfamily. The Emesinae differ from all the Saicinae by the anterior acetabula, which open downward in the latter (fig. 18D) and forward in the Emesinae (fig. 18F).

Key to the Tribes of the Emesinae

1. Winged 2
   Micropterous or apterous 7
2. M inserted on r-m cross vein of forewings (fig. 5C, E); if apparently inserted on submarginal vein, then point of insertion situated approximately at level of termination of 1A at hind border of wing (fig. 37L); claws of all leg simple (fig. 4C, H), very rarely claws of mid and hind legs with a pointed process (fig. 4G), but then claws of forelegs still simple 3
   M inserted on submarginal vein of forewings, point of insertion situated much apicad of level of termination of 1A on hind border of wing (fig. 5F–K); under surface of claws of forelegs, mid, and hind legs with more or less conspicuous incisions or projections (fig. 4E, I, J) 4
3. Forewings with two cells (figs. 5C; 18G); hind wings simple (figs. 6A; 18H); fore tarsi three-segmented, basal segment only about half as long as second or third (fig. 18J, O) . . . . . Collartidini
   Forewings with a single cell (fig. 5E); hind wings in most cases with a transverse thickening apicad of cross vein (fig. 6B, C); fore tarsi either not segmented, two-segmented, or three-segmented; if three-segmented, then the basal segment not shorter than any of the following (fig. 3I, J) . . . . . Leistarchini
4. Basal spiniferous process of posteroventral series of fore femur invariably well developed and conspicuously larger than any of other processes (fig. 2C, F); fore tarsi strongly sclerotized, either unsegmented (fig. 3M) or divided, but segments not movably articulated and only very sparsely setose above and at sides (figs. 2C; 3L; 129C; 142M; 155E); scutellum and metanotum invariably without spines (fig. 128C) 5
   Basal spiniferous process of posteroventral series of fore femur, if at all well developed, not conspicuously larger than any of the remaining (figs. 65D; 94B, D); fore tarsi not strongly sclerotized, invariably segmented, segments movably articulated, hairy on all surfaces (figs. 3 O; 4B); scu-

tellum or metanotum or both frequently spined (figs. 68A, B; 103B) 6

5. Fore tarsi two-segmented (fig. 3L); forewings with two (fig. 132A) or three cells (fig. 5G); hind wings with m-cu cross vein well developed (fig. 6F) . . . . . Deliastini

Fore tarsi either not segmented (fig. 3M) or three-segmented (fig. 4A); forewings with one (fig. 142C) or two cells (fig. 5H); hind wings lacking m-cu cross vein (fig. 6I) . . . . . Metapterini

6. Small insects, generally less than 10 mm.; under surface of fore tibiae only with strong setae (fig. 3A); basal angle of discal cell of forewings connected to costal margin by a short oblique vein (fig. 5J, K); apex of anal lobe of hind wings with a small lobate projection (fig. 6H, J) . . . Ploiariolini

Larger insects, only rarely less than 10 mm.; under surface of fore tibiae with strongly sclerotized spinulets or denticles (fig. 3D, E); base of discal cell not connected to costal margin by a vein (fig. 5F, I); apex of anal lobe of hind wing not projecting (fig. 6E, G) . . . . . Emesini

7. Basal spiniferous process of posteroventral series of fore femora, if at all distinct, either not conspicuously larger than any of the other processes (fig. 2A, B, D) or apically with more than one spine or bristle (fig. 2G) 8

Basal spiniferous process of posteroventral series of fore femora conspicuously larger than any of remaining processes, its apex with a single spine (fig. 2C, F) 12

8. Fore tarsi conspicuously longer than those of mid and hind legs, strongly sclerotized, either not segmented (fig. 180F, J) or three-segmented (figs. 2B; 3J); in latter case, segments not movably articulated . 9

Fore tarsi subequal in size to those of mid and hind legs, two- or three-segmented, weakly sclerotized, hairy on all surfaces, segments movably articulated (figs. 3H, O; 18J, O) 10

9. Fore tibiae with two irregular series of conspicuous spiniferous processes; fore tarsi not bare above and at sides, some spines present on lateral surface (fig. 180F, J) . . . . . Metapterini

Fore tibiae without conspicuous spiniferous processes; fore tarsi virtually bare above and at sides, lateral surface invariably without spines (fig. 2B) . . Leistarchini

10. Fore tarsi two-segmented (figs. 120F, I, J; 123D, H) . . . . . Ploiariolini

Fore tarsi three-segmented (fig. 18J, O) . . 11

11. Basal segment of fore tarsi only about half as long as either second or third (fig. 18J, O); spines present on under surface of head, upper surface of rostrum, and coxae of forelegs (fig. 18C, J) . . . Collartidini

Basal segment of fore tarsi not shorter than second or third (figs. 67E, F; 72CC); no spines on the regions mentioned (figs. 67D; 72U) . . . . . Emesini

12. Fore tarsi two-segmented (fig. 129A); large basal spiniferous process of posteroventral series of fore femora inserted at its own or less than its own length from base of femur (fig. 129A, R); armature of under surface of fore tibiae consisting only of spinelike setae (fig. 129B); metanotum not longer than wide (fig. 128E, F) . . . . Deliastini

Fore tarsi not segmented, two-segmented, or three-segmented; if two-segmented, then large basal spiniferous process of posteroventral series of fore femora situated considerably more than its own length from base of femur (figs. 155E, F; 158D, K; 169B, C); armature of under surface of fore tibiae consisting of short stout denticles (figs. 155J; 158M; 169G), and metanotum distinctly longer than wide (figs. 155A; 158A; 169A) . . . . . Metapterini

COLLARTIDINI, NEW TRIBE

DESCRIPTION: Small-sized species (5–8 mm.). General color brownish, without conspicuous markings. Setae of mid and hind legs and of abdomen not differentiated into microchaetae and macrochaetae.

Under surface of head, upper surface of rostrum, and fore coxa with spines.

Head elongate-fusiform, anteocular much longer than postocular portion. Eyes of winged form distinctly transverse in dorsal view. Rostrum slightly bent between first and second segments. Ratio of first antennal segment to third, 1/0.45.

Winged and apterous forms known; mesonotum of winged form either covered by posterior lobe of pronotum or not; humeral angles not spined. Scutellum without, metanotum with spine.

Forelegs with spines on coxa, femur, and tibia, in some cases also on trochanter. Tibia slightly but distinctly shorter than femur. Tarsus one-third as long as tibia, three-segmented, not strongly sclerotized, hairy on all surfaces; first segment only about half as long as either second or third. Claws of forelegs very slender, simple, identical in

size; arolia elongate. Claws of mid and hind legs similar to those of forelegs.

Forewings with discal and basal cell; portion of M limiting discal cell inserted on r-m cross vein. Hind wing with hamus and m-cu cross vein well developed, hamus approaching Sc+R only gradually; anal lobe small, shorter than half of length of wing, not lobulate apically, lacking transverse thickening.

Seventh tergite of male covering genitalia from above. Phallus symmetrical. Phallosoma subcylindrical, largely membranous; endosoma simple, with scattered, small, toothlike projections. Female genitalia with third gonapophyses well individualized, not fused.

TYPE GENUS: *Collartida* Villiers.

DISTRIBUTION: Ethiopian Region (equatorial Africa) and Oriental Region (Ceylon).

OBSERVATIONS: The Collartidini possess an array of characters that make them the most plesiomorphic of all the Emesinae, viz., the venation of the forewings and hind wings, the structure of the fore tarsi, with their very short basal segment, and the simple claws of all legs. The armature of spines on the head, rostrum, and fore coxae is equally a plesiomorphic character found only very rarely in the higher Emesinae but present in all the Saicinae.

KEY TO THE GENERA OF THE COLLARTIDINI

Under surface of head with only isolated, spinelike setae (fig. 18C, F); posterior lobe of pronotum of winged form not covering mesonotum (fig. 18B, C); fore trochanter with spinelike setae (fig. 18J); spinelike setae of fore femur extending to apex of segment (fig. 18J) . . . . . *Collartida*

Under surface of head with isolated, spinelike setae and with a fascicle of similar setae near apex (fig. 18W); posterior lobe of pronotum of winged form covering mesonotum (fig. 18X); fore trochanter lacking spinelike setae; spinelike setae of fore femur not extending to apical half of segment . . . . . *Stenorhamphus*

COLLARTIDA VILLIERS

Collartida VILLIERS, 1949a, p. 324.

DESCRIPTION: Macropterous or apterous. Small species (about 5 mm.).

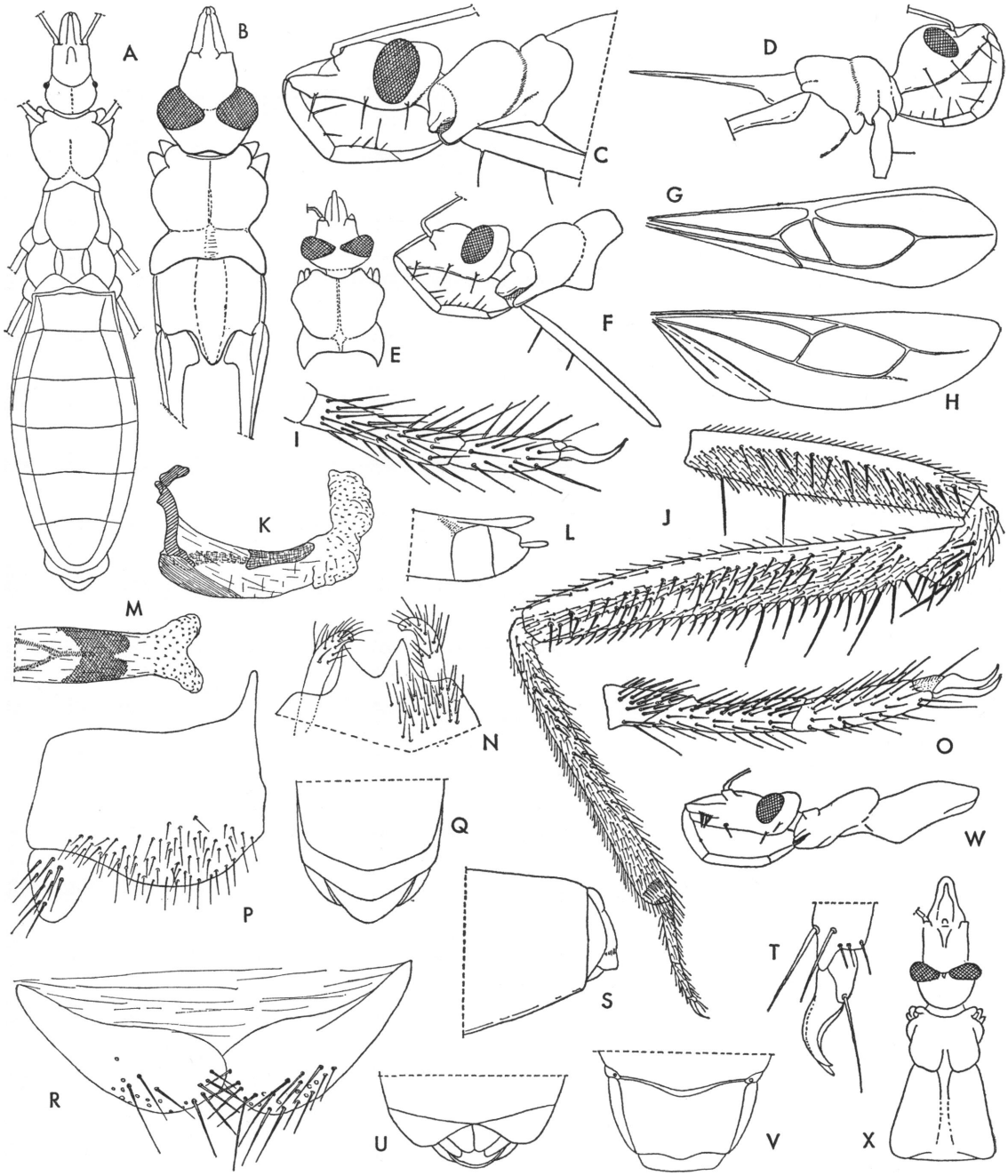
Body surface shining, smooth. Legs slender and elongate. General color brownish; conspicuous pattern elements absent.

Macropterous male and female: Head elongate fusiform; anteocular much longer than postocular portion, the latter rounded-truncate behind in dorsal and lateral views. Under surface of head with three pairs of spinelike setae inserted on short, wartlike tubercles; upper surface of first and second rostral segments with similar setae. Interocular furrow situated about at level of center of eyes, in some cases difficult to perceive. Eyes very large, closely approaching each other on upper surface of head. Rostrum slender, distinctly bent between first and second segments; first as long as anteocular region, second slightly, third distinctly, shorter than first. Antennae inserted midway between eyes and apex of head; second segment only about half as long as first.

Pronotum covering only basal fourth of mesonotum; fore lobe wider than long, widest at middle, its disc sulcate longitudinally along center; hind lobe short and wide, emarginate behind. Scutellum small, rounded apically; metanotum with a short projection or spine. Hind border of prosternum almost straight.

Forelegs slender. Coxa elongate, with one series of numerous spinelike setae on inner, and two such setae on basal half of, anterior surface. Trochanter with several spinelike setae. Posteroventral series of femur beginning at base of article, composed of long and medium-sized, slender, spinelike setae inserted on very short bases, setae becoming progressively shorter toward apex of segment. Anteroventral series composed of two parallel rows consisting of subequal, slender, spinelike setae of medium size similar to those of other series. Tibia four-fifths as long as femur, its ventral surface with two rows of short, semi-erect, spinelike setae similar to those of femur. Tarsus about one-third as long as femur, not strongly chitinized, hairy on all surfaces, three-segmented. Basal segment shortest, second and third each twice as long as first. Claws slender, curved, simple; empodial seta long. Mid and hind legs long and slender, posterior femora distinctly surpassing apex of abdomen. Tarsus of mid and hind legs three-segmented, first segment slightly shorter than either second or third, the two latter subequal; claws slender, curved, simple in structure.

Forewings with discal and basal cell, discal


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X

longer than basal cell. Portion of M closing discal cell inserted on very short r-m cross vein; M and Cu completely fused basad of basal cell. Pterostigma falling distinctly short of wing tip. Hind wing with hamus approaching Sc+R gradually, meeting latter only at basal half. R+M and Cu extending beyond level of cross vein, former almost attaining wing border; Cu shorter, sending out a cross vein toward center of R+M. Anal lobe very narrow and short.

Abdomen broad; sternites and tergites with somewhat irregularly arranged small bristles of uniform size.

Male: Last tergite subsemicircular, covering most of genital region from above. Seventh sternite large. Pygophore continuous with body outlines in lateral view; its posterosuperior border with a lamellate, apically incised projection. Parameres short, rod-shaped, somewhat curved at apex, with simple bristles. Phallus symmetrical. Basal plates medium sized; struts well developed, directed toward dorsal surface of phallus, fused on apical half. Phallosoma subcylindrical, membranous, with a basal ventral, and a subapical dorsal, sclerotization. Endosoma simple, with scattered tiny projections, its apical portion (in everted state) somewhat bifid.

Female: Eighth and ninth tergites subvertical, eighth much larger than ninth, latter narrowly transverse. Gonocoxites and anterior gonapophyses normally developed, well separated. Third gonapophyses transverse, well individualized, not fused.

Apterous female: General characters as in macropterous form. Eyes very small. Interocular sulcus situated before level of eyes. Fore lobe of pronotum subglobular, hind lobe extremely short, in shape of a narrow band. Mesonotum and metanotum without spines or projections.

TYPE SPECIES: *Collartida oculata* Villiers (monobasic).

DISTRIBUTION: Equatorial Africa.

OBSERVATIONS: Villiers (1949a) placed *Collartida* first in the Leistarchini and later (1961) near genera now included in the Ploiariolini. As is shown above, *Collartida*, though not lacking autapomorphic features, is more plesiomorphic than any of the remaining Emesinae and therefore warrants the creation of a new tribe.

KEY TO THE SPECIES OF *Collartida*

Apterous (fig. 18A); eyes very small, dorsal interocular distance several times as large as their width (fig. 18A) . . . . . *microphthalma*

Fully winged; eyes large, interocular dorsal distance much less than width of eyes (fig. 18B, C, E, F) . . . . . *oculata*

Collartida microphthalma Villiers

Figure 18A

Collartida microphthalma VILLIERS, 1961, p. 37, figs. 5, 6.

One of Villiers' illustrations is here reproduced.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Female, Musée Royal de l'Afrique Centrale.

Collartida oculata Villiers

Figure 18B, C, E-V

Collartida oculata VILLIERS, 1949a, p. 326, figs. 161–167.

Two reproductions of Villiers' illustrations (fig. 18E, F) are accompanied here by several new drawings to demonstrate certain characters mentioned in the generic description.

MATERIAL EXAMINED: *Sierra Leone:* Njala, June 19, 1925, at light [E. Hargreaves;

FIG. 18 (OPPOSITE PAGE). A. *Collartida microphthalma*, female, dorsal view. B, C. *Collartida oculata*, female from Lukolele. B. Anterior portion of body, dorsal view. C. Anterior portion of body, lateral aspect. D. *Carayonia* sp., female, Stanleyville, anterior portion of body, lateral view. E–O. *Collartida oculata*, male from Sierra Leone. E. Head and thorax, dorsal view. F. Head and thorax, with fore coxa, side view. G. Forewing. H. Hind wing. I. Posterior tarsus. J. Foreleg. K. Phallus, side view. L. Apex of abdomen, lateral aspect. M. Phallus, dorsal view. N. Apex of pygophore with parameres, as seen on slide mount. O. Fore tarsus. P–V. *Collartida oculata*, female from Lukolele. P. Gonocoxite with anterior gonapophysis. Q. Genital region, seen from above. R. Third gonapophyses. S. Genital region, lateral aspect. T. Praetarsus of foreleg, with claws. U. Genital region, ventral view. V. Genital region, seen from behind. W, X. *Stenorhamphus nubiferus*, female. W. Head and prothorax, lateral view. X. Head and pronotum, dorsal aspect. (A adapted from Villiers, 1961; E and F, from Villiers, 1949a; and W and X, from Elkins, 1962.)

British Museum (Natural History)], one male. *Uganda:* Bwanba, April–May, 1948 [W. H. R. Lumsden; British Museum (Natural History)], one specimen. *Congo (Léopoldville)*: Lukolele, left bank of Congo River, latitude 1° 5′ S., 1921 (J. P. Chapin; the American Museum of Natural History), one female. A female paratype has also been examined.

DISTRIBUTION: Congo (Léopoldville); Sierra Leone; Uganda.

TYPE: Male, Musée Royal de l'Afrique Centrale.

STENORHAMPHUS ELKINS

Stenorhamphus ELKINS, 1962, p. 422.

DESCRIPTION: Macropterous female: Small species (8 mm.).

Body surface dull; legs long and slender. Color brownish, concolorous, lacking conspicuous pattern elements.

Head elongate-fusiform, anteocular about three times as long as postocular portion, latter rounded behind in dorsal, and truncate in lateral, aspect. Under surface of head with a few isolated spines at level of posterior border of eyes and of antenniferous tubercle, and with a fascicle of delicate spines halfway between antenniferous tubercle and apex of head; first and second rostral segments on upper surface with 1+1 series of spinelike setae. Eyes medium sized, remote from level of under surface in lateral view, strongly transverse and closely approaching in dorsal view. Rostrum slender, distinctly bent between first and second segments; first distinctly shorter than anteocular region, second slightly longer than first, third shortest. Antennae inserted midway between eyes and apex of head; antenniferous tubercle conspicuous; second segment about half as long as first.

Pronotum completely covering mesonotum; fore lobe about as wide as long, its sides rounded, sulcate along middle posteriorly; sides of hind lobe straight, diverging posteriorly, hind border straight, disc sulcate along middle. Scutellum small, its posterior border almost straight, at center with a very short conical process. Metanotum almost three times as long as scutellum, slightly elevated and bluntly pointed at apex.

Forelegs slender. Coxa elongate, with a series of spinelike setae on inner surface. Trochanter lacking spinelike setae. Posteroventral series of fore femur beginning at base of article, composed of long and medium-sized, slender, spinelike setae inserted on very short bases, largest approximately at middle of article. Anteroventral series composed of two parallel rows of subequal, slender, medium-sized, spinelike setae. Apical fourth of femur devoid of spinelike setae. Mid and hind legs long and slender, covered with distinct pilosity.

Forewings with discal and basal cells, discal longer than basal cell. Portion of M closing discal cell inserted on very short r-m cross vein; M and Cu completely fused basad of basal cell. Pterostigma falling slightly short of wing tip.

Abdomen with sides subparallel, almost imperceptibly widening posteriorly. Eighth and ninth tergites subvertical.

TYPE SPECIES: *Guithera nubifera* Distant (monobasic).

DISTRIBUTION: Ceylon.

OBSERVATIONS: No specimens have been examined for this monograph. The above description is based on the data presented by Elkins (1962).

Stenorhamphus nubiferus (Distant)

Figure 18W, X

Guithera nubifera DISTANT, 1906, p. 365.

Stenorhamphus nubifera: ELKINS, 1962, p. 423, figs. 15, 18–20.

Two of Elkins' drawings are reproduced here.

DISTRIBUTION: Ceylon.

TYPE: Female, British Museum (Natural History).

LEISTARCHINI STÅL

Leistarchida STÅL, 1862, p. 504.
Emesina STÅL, 1872b, p. 125.
Leistarcharia STÅL, 1874, p. 92.
Leistarchini VAN DUZEE, 1916, p. 28.
Ploeariini VILLIERS, 1948, p. 443.
Orthungini VILLIERS, 1948, p. 454.

DESCRIPTION: Small to large-sized species (5–25 mm.). Color generally rather uniform, rarely with more or less conspicuous markings. Setae of mid and hind legs and of abdomen either differentiated or not into microchaetae and macrochaetae.

Under surface of head, upper surface of rostrum and fore coxae in some cases with, mostly without, spines.

Rostrum not or only very slightly bent between first and second segments. Ratio of first antennal segment to third, 1/0.47–0.13.

Winged, micropterous, and apterous forms known, the last two not rare. Mesonotum of winged form covered by pronotum or not. Humeral angles of pronotum in no case spined. Scutellum and metanotum mostly without spines.

Coxa of forelegs rarely spined. Trochantera with or without spines. Femur and tibia with spines, those of tibia of various shapes; posteroventral series of femur in some cases at base with a large penicillate process. Tibia from slightly shorter than femur to less than half of its length. Tarsus very rarely less than half as long as tibia; generally from half as long to distinctly longer than tibia, three-segmented or one-segmented, very rarely two-segmented, relative size of segments varying but first in no instance conspicuously shorter than others, generally from slightly to very conspicuously longer than the remaining, either singly or combined. Tarsus almost bare above and at sides, strongly sclerotized; if segmented, articles either well individualized, though apparently not movably articulated, or with continuous outlines and forming an often curved tarsus similar in general aspect to unsegmented one. Claws of forelegs simple, generally short, frequently unequal in size, or only a single claw present; arolia very short. Claws of mid and hind legs simple, lacking projections (except for some species of *Ploiaria*).

Forewings with a single cell; portion of M limiting cell inserted on r-m cross vein, in a single instance on Sc+R, basad of level of termination of 1A on hind border of wing. Hind wing with hamus and m-cu cross vein well developed; generally a transverse thickening behind level of cross vein; anal lobe mostly as long as or longer than half of length of wing, in some cases lobulate apically.

Basal abdominal tergite without spine. Last tergite of male not covering genitalia from above. Male phallus generally symmetrical, in some cases endosoma slightly asymmetrical. Phallosoma largely membranous, subcylindrical; endosoma generally with very numerous spinelike processes of various sizes, arranged in from one to very numerous longitudinal rows or groups. Female genitalia with third gonapophyses very rarely individualized, generally fused to form a syngonapophysis, latter often deeply incised.

Male: Testes compact, subtriangular. Seminal vesicles tubular. Mesadenia with two lobes each, one opaque, one transparent.

TYPE GENUS: *Leistarches* Stål.

DISTRIBUTION: All zoogeographical regions; no endemic genera known in the New World.

OBSERVATIONS: The Leistarchini agree with all the higher Emesinae in the lengthening of the basal segment of the fore tarsi but do not share with them the specialized claws on their forelegs, mid, and hind legs, being plesiomorphic in this respect. Another plesiomorphic trait for the tribe as a whole is the existence of several genera, some with numerous species, that possess spines on the under side of the head and, in some cases, also on the rostrum and fore coxae. The Leistarchini are well defined by the following autapomorphic features: the venation of the forewings, a transverse thickening of the hind wings, the short arolia of the fore praetarsus, and the characteristic armature of the endosoma of the phallus.

KEY TO THE GENERA OF THE LEISTARCHINI

1. Macropterous (figs. 24A; 43A; 49A) . . . 2
   Micropterous or apterous (figs. 24B; 43E; 49W) 21
2. Ventral spines of fore femur beginning slightly beyond middle of article (fig. 43J); forelegs apparently with a single claw, latter almost straight, as long as one-third of length of fore tarsus (fig. 43J) . . . *Phryxobotrys*
   Ventral spines or processes of fore femur beginning at or near base of article; claw or claws of forelegs different, much shorter than one-third of length of tarsus . . . 3
3. Under surface of head with spinelike setae inserted on short, wartlike bases (figs. 19F; 40E; 59B; 63B) 4
   Under surface of head without spinelike setae 8
4. Fore tarsus not segmented, as long as, or longer than, tibia (figs. 40C; 63D) . . . 5
   Fore tarsus segmented, shorter than tibia (figs. 19D; 59E) 7
5. Pronotum covering mesonotum (figs. 40A; 62A, D); discal cell of forewing longer than

maximum width of forewing (figs. 40J; 41I; 62A) 6

Pronotum not covering mesonotum (fig. 63A, B); discal cell of forewing shorter than maximum width of forewing (fig. 63A) . . . . . *Tinnunga*

6. Upper surface of first rostral segment with one pair of spinelike setae inserted on short, wartlike bases (fig. 62C, D); base of fore femora without penicillate process (fig. 62D, E); mid and hind tarsi two-segmented (fig. 62F) . . . . . *Tinnatunga*

Rostrum lacking spinelike setae (figs. 40E; 41B); base of fore femur with penicillate process (figs. 40C, F; 41G); mid and hind tarsi three-segmented (fig. 40M) . . . . . *Orthunga*

7. Under surface of head with generally three or, rarely, four or five pairs of spinelike setae, upper surface of rostrum lacking such setae (fig. 59B) . . . . . *Tinna*

Under surface of head with eight pairs of spine-like setae, latter also present on upper surface of first rostral segment (fig. 19F) . . . . . *Armstrongula*

8. Fore femur at or near base with a long, penicillate process starting posteroventral series (figs. 29H–J; 38C, P) 9

Fore femur without penicillate process . . 10

9. Penicillate process of fore femur situated at base of article (fig. 38C); hind lobe of pronotum covering mesonotum (fig. 38A) . . . . . *Nesita*

Penicillate process of fore femur situated at some distance from base of article (fig. 29H, I); hind lobe of pronotum leaving mesonotum exposed (fig. 29A) . . . . *Gomesius*

10. Hind lobe of pronotum covering mesonotum, in some cases with exception of a small area before scutellum (figs. 22A; 24A; 33A; 34K; 58A) 11

Hind lobe of pronotum leaving at least one-half of length of mesonotum exposed (figs. 28A; 35A, B; 36B, C; 37A, B; 56A, C) 17

11. Pronotum covering mesonotum, scutellum, and extreme base of forewings (fig. 24P); fore femur lacking accessory series (figs. 23C; 24 O); fore tarsus less than half as long as tibia, three-segmented, the segments subequal in length (figs. 23C; 24 O); pterostigma falling considerably short of wing tip (fig. 23I) . . . . . *Bagaudina*

Pronotum in no instance covering scutellum and base of forewings (figs. 22A; 33A; 34K); fore femur with accessory series (figs. 22J; 25N; 33D; 58F); fore tarsus at least half as long as tibia, two- or three-segmented, basal segment conspicuously longer than remainder combined (figs. 22D; 25B; 33B; 34N; 58D; pterostigma virtually reaching wing tip (figs. 22A; 25Q; 33A; 34 O; 58G) 12

12. Interocular furrow strongly backwardly curved to far beyond level of posterior border of eyes, only superficial, not forming a distinct impression in lateral view of head (figs. 33A, B; 34K, L; 58A–C) 13

Interocular furrow only slightly backwardly curved, hardly if at all surpassing level of posterior border of eyes, invariably deeply impressed, forming a conspicuous incision on dorsal surface of head when viewed laterally (figs. 22A–C; 25A, B) 15

13. Fore tarsus three-segmented (figs. 34N; 58D) 14

Fore tarsus not segmented (fig. 32D) or two-segmented (fig. 34B) . . . . . *Guithera*

14. Hind lobe of pronotum normal in shape, approximately as wide as long, its sides subparallel (fig. 58A); forewings with Rs situated midway between apex of discal cell and wing tip (fig. 58G) . . . *Pseudobagauda*

Hind lobe of pronotum modified, much shorter than wide across humeral angles, its sides strongly divergent posteriorly (fig. 34K); forewings with Rs much nearer to wing tip than to apex of discal cell (fig. 34 O) . . . . . *Bagaudella*

15. Second rostral segment not surpassing level of anterior border of eyes (fig. 26C); posteroventral series of fore femur beginning at a considerable distance from base of article (fig. 26F); discal cell of forewing very narrow and elongate, about 10 times as long as wide, its apex close to wing tip (fig. 26B) . . . . . *Bettyella*

Second rostral segment surpassing level of anterior border of eye (figs. 21B; 22C; 25L); posteroventral series of fore femur beginning virtually at base of article (figs. 21C, D; 22D; 25B, N); discal cell of forewing shorter, much less than 10 times as long as wide, its apex remote from wing tip (figs. 21J, N, O; 22A; 25Q) 16

16. Fore femur (fig. 25B, N) with spines at base of posteroventral series very short and stout, followed by a small group of long spines; anteroventral series interrupted near base (fig. 25N); fore tarsus more than four-fifths of length of tibia (fig. 25B), under surface of all tarsal segments with spiniform setae (fig. 25P); first tarsal segment not more than twice as long as second and third combined . . . . . *Barrosia*

Fore femur (fig. 22D) with all spines at base

of posteroventral series long and slender; anteroventral series not interrupted at base (fig. 21D); fore tarsus not more than four-fifths as long as fore tibia (figs. 21C; 22D); under surface of all tarsal segments glabrous, with exception of a fascia of short setae at base of first segment (figs. 21F; 22F); first tarsal segment more than twice as long as second and third combined . . . . . *Bagauda*

17. Hind lobe of pronotum relatively well developed, covering from one-third to one-half of disc of mesonotum (fig. 36A–C); forewings with Pcu meeting discal cell slightly basad of level of anterior basal angle of cell and remote from level of termination of 1A on hind border of wing (fig. 36D); region basad of discal cell slightly convex . . . . . *Lhostella*

Hind lobe of pronotum very short, collar-like, covering only extreme base of mesonotum (figs. 28A; 35A; 37A, B; 56A, C); forewings with Pcu meeting discal cell somewhat apicad of level of anterior basal angle of cell and rather near level of termination of 1A on hind border of wing (figs. 28H; 35M; 37L; 56A); region basad of discal cell not convex 18

18. Scutellum and metanotum spined (fig. 28G) . . . . . *Gnomocoris*

Scutellum and metanotum not spined (figs. 35A, B; 37A, B, F; 56A) 19

19. Forewing with M inserted directly on submarginal vein (fig. 37L); mesothorax greatly swollen (fig. 37B, H) . . . . *Mafulemesa*

Forewing with M inserted on r-m cross vein as usual for the tribe (figs. 35M; 46K); mesothorax not swollen (fig. 35B) . . .20

20. Posterior border of prosternum rounded (fig. 35C); each of the series of under surface of fore femur composed of several irregular rows of spinelike setae (fig. 35H) . . . . . *Leistarches*

Posterior border of prosternum emarginated (fig. 44B); spines or spinelike setae of under surface of fore femur arranged in two simple series (figs. 44G; 45D) . . . *Ploiaria*

21. Under surface of head with spinelike setae inserted on short, wartlike bases (figs. 19E, F; 40E; 60B, C, E, F) 22

Under surface of head without spinelike setae 25

22. Base of fore femur with penicillate process (fig. 40C) . . . . . *Orthunga*

Femur without penicillate process 23

23. Fore tarsus three-segmented (figs. 19D; 60H) 24

Fore tarsus not segmented (fig. 62D, E) . . . . . *Tinnatunga*

24. Head ventrally with about eight pairs of spinelike setae, similar setae also present on upper surface of first rostral segment (fig. 19F) . . . . . *Armstrongula*

Head ventrally with from three to five pairs of spinelike setae, the latter not found on rostrum (fig. 60C, F) . . . . . *Tinna*

25. Posteroventral series of fore femur beginning at base of article with a large penicillate process (figs. 20B; 38N; 39B, I; 43J) . .26

Fore femur without penicillate process . .27

26. Postocular region of head subcircular in dorsal view (fig. 20D); under surface of fore tibia with simple inclined setae only (fig. 20F); fore tarsus with two claws (fig. 20C); pygophore of male lacking posterior process (fig. 20M) . . . . . *Atisne*

Postocular region of head with sides strongly converging posteriorly in dorsal view, constricted at middle (fig. 38L); fore tibia with deflexed, strong, short spines (fig. 38F); fore tarsus with a single claw only (fig. 38E); pygophore of male with a large, spinelike process on posterosuperior margin (fig. 38J) . . . . . *Nesita*

27. Fore tarsus not segmented; under surface of fore femur with long spines inserted on short processes, beginning at middle of article (fig. 43J); fore tibia with simple setae only, fore tarsus apparently with a single claw, one-third as long as tarsus (fig. 43J) . . . . . *Phryxobotrys*

Fore tarsus segmented; structure of forelegs not as above 28

28. Fore femur with accessory series (fig. 25N, T) 29

Fore femur lacking accessory series (figs. 24 O; 51B) 31

29. Fore tibia and tarsus combined distinctly shorter than femur (figs. 26F; 27H) . . . . . *Bettyella*

Fore tibia and tarsus combined approximately as long as femur (fig. 25B, T) 30

30. Second segment of rostrum shorter than first (fig. 25B); anteroventral series of fore femur widely interrupted at base, one spinelike seta basad of interruption (fig. 25N) . . . . . *Barrosia*

Second rostral segment slightly longer than first (fig. 25T); anteroventral series of fore femur not interrupted at base (fig. 25T) . . . . . *Millotina*

31. Posterior border of prosternum emarginated (fig. 44B); abdomen of female not elongate-pedunculate (figs. 44T; 47T) . . *Ploiaria*

Posterior border of prosternum rounded (as shown in figs. 22G; 35C); abdomen of fe-

male elongate-pedunculate (fig. 24B) . . . . . *Bagaudina*

The genera *Lethierrya* and *Pleias* could not be included in the key.

ARMSTRONGULA WYGODZINSKY

Armstrongula WYGODZINSKY, 1950a, p. 83.

DESCRIPTION: Macropterous or micropterous. Small species (7–8 mm.).

Body surface dull, minutely rugose or granulated. Body and appendages with conspicuous pattern elements.

Macropterous male: Head short; anteocular and postocular regions subequal in length, postocular subsemicircular in dorsal and lateral aspects. Interocular furrow situated about at level of middle of eyes. Eyes medium-sized. Under surface of head with 1+1 series of numerous slender, spinelike setae inserted on short basal tubercles. Rostrum slender, not bent between first and second segments; first segment attaining level of anterior, second reaching that of posterior, border of eyes; first slightly longer than second, third about as long as second. Upper surface of first segment with two rows of spinelike setae similar to those of head. Antennae inserted near apex of head.

Pronotum not covering mesonotum. Fore lobe subglobular; hind lobe relatively well developed but still covering only extreme base of mesonotum. Mesonotum subrectangular, slightly longer than wide; disc faintly convex, with a median longitudinal impression. Scutellum and metanotum lacking spines or processes. Upper portion of anterior acetabula pointed, conspicuously projecting. Posterior border of prosternum emarginated.

Forelegs slender. Coxa elongate, its dorsal surface basally, and its inner surface on its apical two-thirds, with a series of spiniform setae. Trochanter projecting ventrally, projection bearing a spinelike seta; similar setae on inner surface of trochanter. Femur slender, slightly curved at base, its under surface with spiniferous processes or spinelike setae arranged in four series, all of which commence near base of article. Posteroventral series composed of large spiniferous processes; processes combined with spines longer than diameter of segment. Anteroventral series interrupted at base, composed of slender, spinelike setae inserted on very short, wartlike, basal tubercles. The two accessory series composed of very short, spinelike setae. Fore tibia more than half as long as femur and about as long as coxa, ventrally with two series of slender, inclined, spinelike bristles. Tarsus less than half as long as tibia, rather heavily sclerotized, virtually bare above and at sides; three-segmented, length of segments decreasing from basal to apical one; under surface with short setae, some of which are spinelike. Two simple claws of identical size. Posterior femora surpassing apex of abdomen. Mid and hind femora with rather sparse, very short setae, tibia with more numerous long setae not differentiated into microchaetae and macrochaetae. Mid and hind tarsi three-segmented, first and third segments subequal in length, the second somewhat shorter; setae of tarsi simple, few in number. Claws simple, very slender.

Venation of forewings as usual for the tribe; anterior and posterior basal angles of discal cell each connected to submarginal cell by a cross vein. Apex of pterostigma carried almost to wing tip. Surface of forewings smooth. Hind wings with hamus approaching Sc+R only gradually. M-cu cross vein curved; Cu not extending beyond cross vein, R+M simple. Transverse thickening well developed.

Abdomen slender, not strongly constricted at base, widest at middle. Connexival margins entire. Setae of sternites and tergites sparse. short, of uniform size. Eighth sternite and tergite completely exposed, short. Pygophore somewhat elongate, its dorsal surface completely sclerotized, its posterior border with a very short median process. Parameres simple, slightly curved, with short setae. Articulatory apparatus medium-sized. Struts fused on apical two-thirds, not surpassing center of phallosoma, the latter with dorsal and ventral sclerotizations well developed, approximately band-shaped; lateral walls not sclerotized. Endosoma asymmetrical, with one row of large and very stout, one row of short triangular, and one row of very numerous slender, projections.

Micropterous female: General characters like those of male. Eyes hardly smaller, head and pronotum slightly but perceptibly more elongate than in male. Mesonotum more than twice as long as metanotum, the latter not longer than wide; mesonotum slightly sulcate

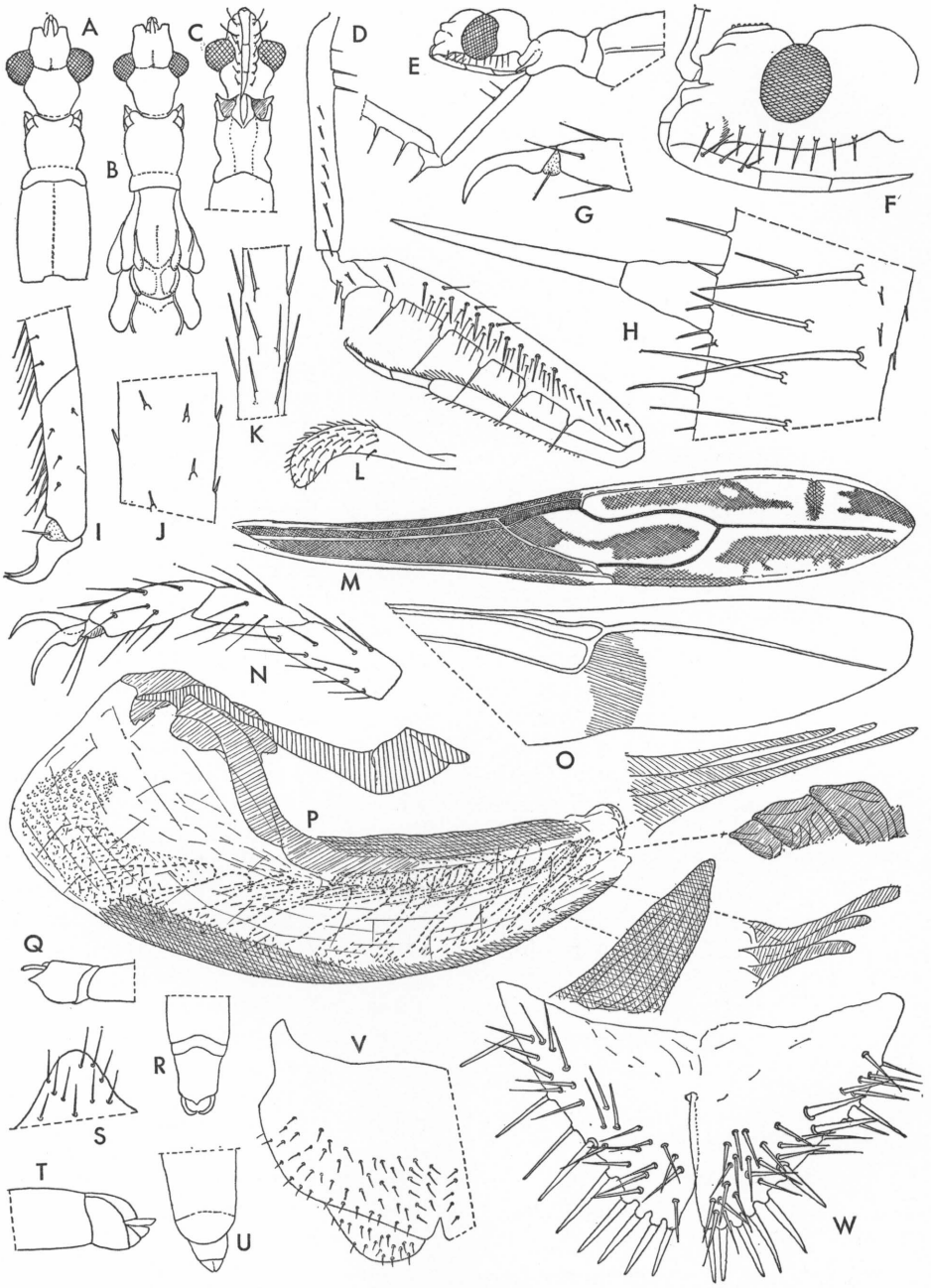


FIG. 19. *Armstrongula tillyardi*. A. Head and thorax of male, dorsal view. B. Anterior portion of body of female, dorsal aspect. C. Anterior portion of body of male, ventral view. D. Foreleg. E. Anterior portion of body of male, side view. F. Head of female, lateral aspect. G. Praetarsus and claw of hind leg. H. Detail of fore femur. I. Apical position of fore tarsus. J. Detail of posterior femur. K. Detail of hind tibia. L. Paramere. M. Forewing, with color pattern. N. Tarsus of hind leg. O. Distal half of hind wing. P. Phallus, lateral view, with several types of spines of endosoma shown with high magnification. Q. Genital region of male, lateral aspect. R. Genital region of male, ventral view. S. Apex of projection of pygophore, high magnification. T. Apex of abdomen of female, lateral aspect. U. Apex of abdomen of female, ventral view. V. Gonocoxites with gonapophysis. W. Syngonapophysis.

along middle, metanotum with a median longitudinal carina. Wing pads of mesonotum and metanotum distinct but minute, not surpassing hind borders of respective sclerites. Abdomen slightly wider than in male, tergites posteriorly at center with a small tubercle. Eighth tergite subsemicircular, continuous with seventh tergite. Ninth tergite subrectangular, much smaller than eighth. Gonocoxites fused, forming a single sclerite, somewhat indented at apex, Gonapophyses well separated, with simple short setae. Syngonapophysis membranous, deeply split along middle, component gonapophyses clearly distinguishable, beset with numerous setae and spines on disc and margins of sclerites.

TYPE SPECIES: *Armstrongula tillyardi* Wygodzinsky (monobasic).

DISTRIBUTION: Australian Region (New South Wales).

OBSERVATIONS: The interpretation of the female genitalia as given in the original description is incorrect; the error is rectified above.

Armstrongula possesses an array of plesiomorphic characters unique in the tribe, such as its small size, the presence of spines on the under surface of the head, upper surface of the first rostral segment, and coxa of the forelegs, the rather short, three-segmented fore tarsus, and the deeply split syngonapophysis of the female. On the other hand, autapomorphic characters, such as the fused gonocoxites of the female and the asymmetrical endosoma of the phallus, also indicate a certain degree of specialization.

Armstrongula tillyardi Wygodzinsky

Figure 19A–W

Armstrongula tillyardi WYGODZINSKY, 1950a, p. 84, figs. 12–34.

Most of the original illustrations are here reproduced; the phallus is analyzed in more detail (fig. 19P).

DISTRIBUTION: Australia (New South Wales).

TYPE: Male, Australian Museum.

ATISNE, NEW GENUS

DESCRIPTION: Apterous male: Medium-sized species (10.25 mm.).

Body surface dull. General color dark brown, spotted and mottled with yellowish.

Head with anteocular and postocular region strongly elevated; anteocular parallel-sided in dorsal aspect, postocular subcircular in dorsal view, much shorter than anteocular. Interocular furrow situated somewhat behind level of middle of eyes, not attaining level of their posterior border. Eyes very small. Rostrum slender, not bent between first and second segments, the latter slightly shorter than first, attaining level of center of eyes; third longer than first or second. Antennae inserted nearer to apex of head than to anterior border of eyes.

Pronotum not covering mesonotum. Fore lobe of prothorax shortly subcylindrical, distinctly narrowed posteriorly, not constricted; hind lobe very short, not clearly marked. Mesonotum about twice as long as wide, metanotum not wider than long, both combined about as long as pronotum. Upper portion of anterior acetabula rounded.

Forelegs stout. Coxa and trochanter lacking spines. Femur widest shortly beyond base, with two series of spiniferous processes. Posteroventral series beginning at base of article with a penicillate process, followed by wartlike processes bearing short spines or short, spinelike setae. Anteroventral series beginning distad of level of base of posteroventral series, not interrupted at base, composed of somewhat irregularly arranged, short spinelike setae inserted on short wartlike bases. Tibia and tarsus of about equal length, both combined slightly shorter than femur. Tibia on ventral surface with two rows of semierect, slender, spinelike setae. Tarsus curved on apical half, bare above and at sides, its under surface with two rows of adpressed, stout, spinelike setae. Two simple claws, one large, one small. Femora of hind legs surpassing apex of abdomen.

Abdomen slender, somewhat widened toward posterior third, tergites simple. Eighth sternite visible for its entire length. Pygophore large, suboval in lateral view, its posterosuperior border emarginated, lacking projection; anterior dorsal bridge large. Parameres sickle-shaped, pointed apically. Phallus symmetrical. Articulatory apparatus short and stout. Phallotheca membranous; ventral sclerotization very weak; dorsal sclerotization distinct. Endosoma with 1+1 groups of toothlike projections.

TYPE SPECIES: *Nesita derelictus* Wygodzinsky.

ETYMOLOGY: An anagram of *Nesita*, a genus of the Emesinae.

DISTRIBUTION: Lord Howe Island.

OBSERVATIONS: As mentioned under *Nesita*, it is now felt that leaving *derelictus* in the otherwise Madagascan genus *Nesita* would suggest a biogeographical relationship for which no evidence exists in the present case. *Atisne* differs from *Nesita* by the differently shaped head, the rounded upper portion of

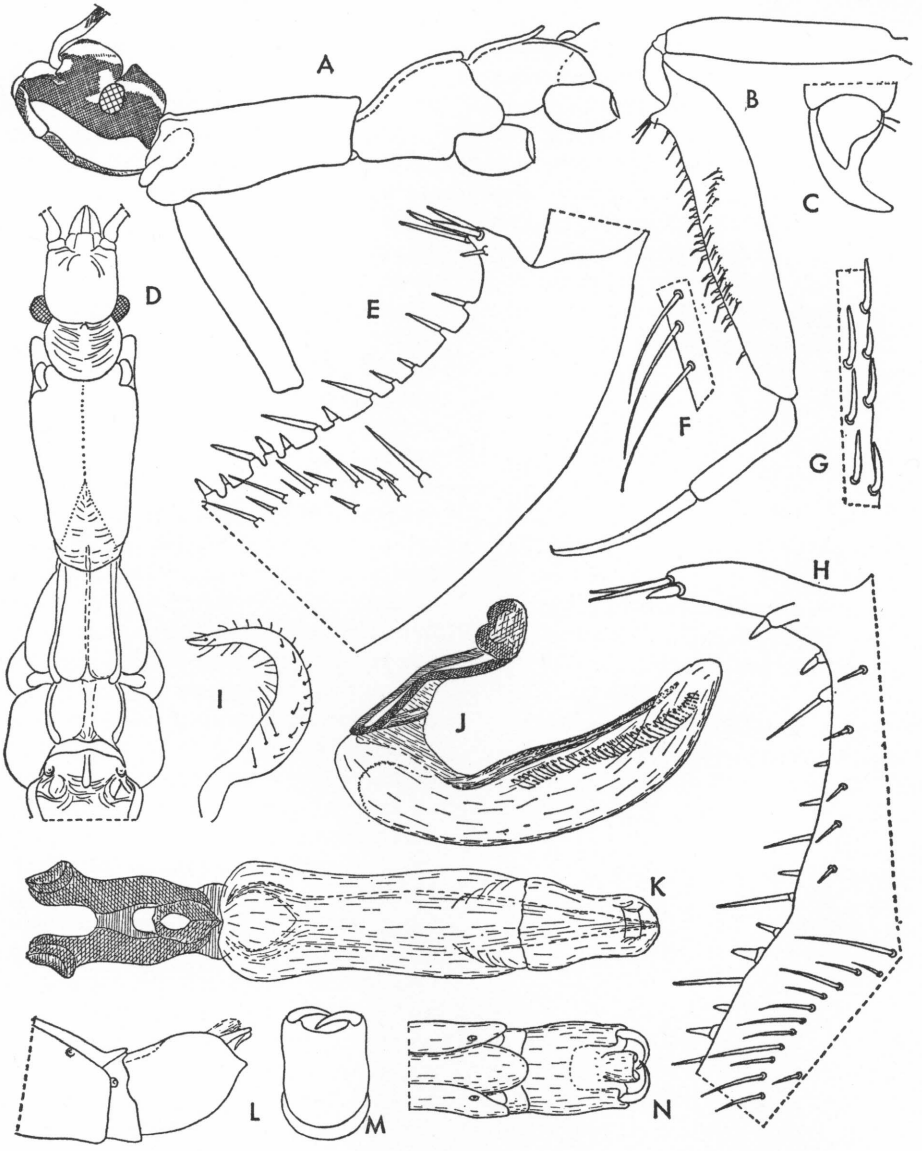


FIG. 20. *Atisne derelictus*. A. Head and thorax of male, lateral view; pattern shown on head only. B. Foreleg. C. Claws of fore tarsus. D. Anterior portion of body of male, dorsal aspect. E. Base of fore femur. F. Setae of ventral surface of fore tibia. G. Setae of under surface of fore tarsus. H. Female, base of fore femur. I. Paramere. J. Phallus, lateral view. K. Phallus, dorsal aspect. L. Apex of abdomen of male, lateral view. M. Genital region of male, seen from behind. N. Apex of abdomen of male, dorsal aspect.

the anterior acetabula, the two claws of the fore tarsus, the slender setae on the under surface of the fore tibia, the extremely short prothorax of the apterous form, the completely visible eighth sternite of the male, the lack of a projection to the pygophore, and the distinctive dorsal sclerotization of the phallus.

The Oriental genus *Gomesius*, known from macropterous forms only, is similar to *Atisne* in the general structure of the forelegs, but *Atisne* cannot be the apterous form of *Gomesius*, as the species of the latter are much larger (20–25 mm.), the posteroventral series of the fore femur begins at a considerable distance from the base of the article, the tibia and tarsus are much shorter than the femur, there is only one claw to the fore tarsus, and the phallus is of very different structure, the endosoma lacking the elongate groups of spinelike processes found in *Atisne* as in most of the Leistarchini.

Atisne derelictus (Wygodzinsky), new combination

Figure 20A–N

Nesita derelictus WYGODZINSKY, 1956, p. 213, figs. 147–160.

The fifth-instar nymphs agree in all essential characters with the adult (shape and color pattern of the head, structure of the forelegs).

The illustrations that accompanied the original descriptions are reproduced here.

MATERIAL EXAMINED: Lord Howe Island (A. M. Lea; South Australian Museum), two nymphs.

DISTRIBUTION: Lord Howe Island.

TYPE: Male, Museum Zoologicum Universitatis.

BAGAUDA BERGROTH

Bagauda BERGROTH, 1903b, p. 12.

DESCRIPTION: Macropterous. Small to large species (6–24 mm.). Body surface dull to shining. Long hairs absent. Concolorous, or with simple to complex pattern elements.

Head fusiform, fore and hind lobe moderately elevated, postocular region semiglobular, rounded to slightly truncate behind in dorsal view. Interocular furrow not extending behind level of posterior border of eyes. Eyes medium-sized to large, in some cases attaining under surface of head. Rostrum slender, straight, not bent between first and second segment, the latter not widened, about as long as first, third as long as, or longer than, first or second. Antennae inserted nearer to apex of head than to anterior border of eyes, rarely at center of anteocular region.

Pronotum completely covering mesonotum, scutellum exposed. Fore lobe of pronotum subcylindrical, slightly narrowed posteriorly, in no case pedunculate, hind lobe subrectangular, with sides faintly diverging posteriorly. Scutellum and metanotum lacking processes or spines. Posterior border of prosternum rounded.

Forelegs stout to slender. Coxa simple. Trochanter often with one or two inconspicuous, small, spinelike setae. Femur with anteroventral and posteroventral series composed of spinelike setae inserted on short, wartlike protuberances, and an accessory series composed of one or several rows of shorter, peglike or spinelike setae. Posteroventral series beginning very near base of article, together with accessory series. Anteroventral series beginning further distad, not interrupted at base. Tibia slightly more than half as long as femur, in some cases produced at apex below; ventral surface with short, deflexed, spiniform setae generally arranged in one row, near apex of article in some cases in two rows. Fore tarsus from slightly to considerably more than half as long as tibia, but always shorter than the latter, three-segmented, the basal segment more than twice as long as the second and third combined. First segment basally with a fascia of short setae; remainder bare. Two subequal claws. Mid and hind legs from medium-sized to very long, posterior femora invariably surpassing apex of body. Femora with isolated slender bristles and numerous tiny conical spinulets. Tarsi of mid and hind legs slender, first and second segments short, subequal in size, third segment almost as long as the two others combined. Claws only slightly curved, very slender, simple.

Forewings with discal cell as usual for the tribe, its posterior basal angle invariably connected, anterior basal angle in some cases connected to submarginal vein by a cross vein. 1A joining posterior border of wing as usual, connected to discal cell by Pcu cross vein. Apex of pterostigma almost attaining

wing tip. Hind wings with hamus angled rather sharply toward Sc+R. M-cu cross vein short, perpendicular to longitudiual axis of wing. R+M extending from level of cross vein to apex of wing; Cu extending only shortly beyond cross vein, free or connected to subbasal region of R+M, thus forming a small cell, in some cases also with a spurlike, basally directed branch emitted from its apex. Transverse thickening developed.

Abdomen slender, moderately narrowed at base. Sternites with microchaetae and macrochaetae.

Male: Eighth sternite well developed. Pygophore large, its anterior dorsal bridge very short, superoposterior border either straight across or with a more or less strongly developed, truncate, triangularly salient, or slender, spinelike process. Parameres slender, curved, with normal setae. Phallus from symmetrical to distinctly asymmetrical; basal plates shorter than phallosoma, in some cases underlain by a broad, platelike structure. Phallobase membranous, lacking distinct ventral, and generally also dorsal, sclerotizations, with or without subapical projections. Struts separated at extreme base only, fused for most of their length, forming a slender, parallel-sided, rodlike sclerite. Endosoma with numerous spinelike projections as usual for the tribe, in some cases asymmetrically arranged.

Female: Eighth tergite transverse, ninth somewhat longer than eighth, both subhorizontal. Gonocoxites and gonapophyses separated. Syngonapophysis deeply incised distally, the apical lobes rounded.

TYPE SPECIES: *Bagauda avidus* Bergroth (monobasic).

DISTRIBUTION: Oriental and Ethiopian regions.

OBSERVATIONS: The gender of *Bagauda* is masculine, as was indicated by its author, a fact apparently overlooked by most subsequent writers.

In many species, the forewing is transversely rugose at the base between its hind border and Pcu+1A. Another remarkable feature observed in many species is the convexity of the membrane in the region immediately basad of the discal cell of the forewing; this character is generally correlated with a curvature of the portion of M between the Pcu cross vein and R+M, toward the interior of the discal cell.

Figure 22M illustrates a portion of the hind wing of an unidentified *Bagauda* from Java to show the occasionally occurring spurlike branch of Cu mentioned in the generic description.

Many species of *Bagauda* are found in caves.

KEY TO THE SPECIES OF *Bagauda*

1. Length of insect, 18–22 mm.; hind lobe of pronotum conspicuously marked as described in couplet 2 2
   Length, under 18 mm.; hind lobe more or less concolorous, never conspicuously marked as described in couplet 2 3
2. Hind lobe of pronotum black, with a wide, median, longitudinal, testaceous band . . . . . *giganteus*
   Hind lobe of pronotum testaceous, with dark borders and 1+1 elongate discal spots . . . . . *creppei, gilletti*
3. Head, thorax, forewings, and abdomen uniformly piceous in dorsal view; first segment of rostrum almost twice as long as second . . . . . *niger*
   Color otherwise; first segment of rostrum much less than twice as long as second (except in *adami*) 4
4. Mid and hind femora uniformly brownish . . . . . *brunneus*
   Mid and hind femora whitish apically . . 5
5. Length, 14–16 mm. 6
   Length, 10–13 mm. 7
6. Hind portion of fore lobe of pronotum and anterior half of hind lobe dark brown, rest of pronotum yellowish brown; vein emanating from apex of discal cell more than half as long as cell . . . . . *cavernicola*
   Hind portion of fore lobe and anterior part of hind lobe of pronotum yellowish, rest of pronotum dark brown; vein emanating from apex of discal cell not more than half as long as cell . . . . . *lucifugus*
7. Forelegs, pronotum, and forewings with contrasting light and dark color pattern . . 8
   Forelegs, pronotum, and forewings rather uniformly brownish, lacking conspicuously contrasting pattern elements 9
8. Fore lobe of pronotum longer than hind lobe (fig. 22A); legs very elongate, hind femora surpassing apex of abdomen by about 8 mm.; forelegs dark, femur with a subapical, light-colored, incomplete annulus (fig. 22D); at least the anterior two-thirds of pronotum dark-colored; forewings brownish, with a


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X

whitish spot basad of discal cell (fig. 22A) . . . . . *similis*

Fore lobe of pronotum not longer than hind lobe; legs shorter, hind femora surpassing apex of abdomen by only 4 mm.; fore coxa, trochanter, and at least base of femur yellowish; fore lobe of pronotum completely yellow with exception of anterior margin; basal portion of forewings yellowish, apical portion brown . . . . . *splendens*

9. Portion of Cu situated between base of discal cell and Pcu cross vein, not curved toward interior of cell 10

Portion of Cu situated between base of discal cell and Pcu cross vein, distinctly curved toward interior of cell (fig. 21J, N, O) . . 11

10. Postocular region relatively elongate, its sides distinctly longer than eyes in dorsal view; first rostral segment twice as long as second . . . . . *adami*

Postocular region relatively short, its sides not distinctly longer than eyes in dorsal view; first rostral segment only very slightly longer than second . . *wagneri, eriksoni*

11. Pcu cross vein of forewing meeting discal cell apicad of level of r-m cross vein (fig. 21 O) . . . . . *avidus*

Pcu cross vein meeting discal cell basad of level of r-m cross vein (fig. 21J, N) . . . 12

12. Pcu cross vein situated only slightly basad of level of r-m cross vein, length of these cross veins about identical (fig. 21J) . *smithersi*

Pcu cross vein situated distinctly basad of level of r-m cross vein, much longer than the latter (fig. 21N) . . . . *tenebricolus*

Bagauda adami Villiers

Bagauda adami VILLIERS, 1962a, p. 886, figs. 1–6.

DISTRIBUTION: Congo (Brazzaville).

TYPE: Male, Muséum National d'Histoire Naturelle.

Bagauda avidus Bergroth

Figure 21 O

Bagauda avidus BERGROTH, 1903b, p. 13.

I have seen a female specimen of *avidus* from the collections of the Helsinki museum which probably is the type. Though it is not very well preserved, its essential characters are easy to observe. The forelegs, very similar to those of *similis* described and figured below, have three-segmented tarsi, although described as one-segmented by Bergroth. The forewings (fig. 21 O) are characterized by the position of the Pcu cross vein which is situated somewhat apicad of the level of the r-m cross vein.

The specimen figured by Distant (1903e) as *avidus* seems to belong to a different species, as the drawing shows quite clearly that the hind lobe of the pronotum is much shorter and darker than the fore lobe. In the specimen of *avidus* belonging to the Helsinki museum, both lobes are identical in length and virtually concolorous.

DISTRIBUTION: India.

TYPE: Female,?Museum Zoologicum Universitatis.

Bagauda brunneus McAtee and Malloch

Bagauda brunneus MCATEE AND MALLOCH, 1926, p. 139, fig. 38.

DISTRIBUTION: Philippines.

TYPE: Female, United States National Museum of the Smithsonian Institution.

Bagauda cavernicola Paiva

Bagauda cavernicola PAIVA, 1919, p. 366.

DISTRIBUTION: Assam.

TYPE: Unknown.

Bagauda creppei Lhoste

Plate 3, figure 1

Bagauda creppei LHOSTE, 1939, p. 4, fig. 3.

MATERIAL EXAMINED: Uganda: Buto Forest, 15 miles west of Kampala, July 1, 1957, 1200 meters (E. S. Ross and R. E. Leech; the California Academy of Sciences), one female,

FIG. 21 (OPPOSITE PAGE). A–L. *Bagauda smithersi*. A. Head and pronotum of female, dorsal view. B. Head and prothorax of male, lateral aspect. C. Foreleg. D. Base of fore femur. E. Claws of foreleg. F. Fore tarsus. G. Apex of fore femur. H. Hind wing. I. Setae of posterior femur. J. Forewing. K. Genital region of male, lateral view. L. Pygophore, seen from behind. M, N. *Bagauda tenebricolus*. M. Pygophore, posterior view. N. Forewing. O. *Bagauda avidus*, forewing. P–X. *Bagauda smithersi*. P. Paramere. Q. Phallus, lateral view, with spines of endosoma under higher magnification. R. Articulatory apparatus. S. Setae of abdominal sternite. T. Gonocoxites with gonapophysis. U. Syngonapophysis. V. Genital region of female, seen from below. W. Apex of abdomen of female, dorsal aspect. X. Apex of abdomen of female, lateral view.

(E. S. Ross and R. E. Leech; the American Museum of Natural History), one male.

DISTRIBUTION: Congo (Léopoldville); Uganda.

TYPE: Female, Institut Royal des Sciences Naturelles de Belgique.

Bagauda eriksoni Miller

Bagauda eriksoni MILLER, 1954a, p. 2, figs. 1A–1C.

The difference between this species and *wagneri* Villiers is so slight, to judge from the available descriptions and figures, that these species cannot be differentiated in the key. It is well to keep in mind that *eriksoni* is based on a female, and *wagneri* is known from the male sex only. Both are South African.

DISTRIBUTION: Rhodesia.

TYPE: Female, Museum Zoologicum Universitatis.

Bagauda giganteus Lhoste

Bagauda gigantea LHOSTE, 1939, p. 3, figs. 1, 2, 4, 8.

The fore claws are subequal in size in this species; the first tarsal segment is three times as long as the second and third combined.

DISTRIBUTION: Congo (Brazzaville); Gabon.

TYPE: Muséum National d'Histoire Naturelle.

Bagauda gilletti Miller

Bagauda gilletti MILLER, 1956, p. 53, figs. 1A–1F.

It has not been found possible to differentiate this species and *B. creppei* in the key.

DISTRIBUTION: Uganda.

TYPE: Male, British Museum (Natural History).

Bagauda lucifugus McAtee and Malloch

Figures 3J; 10F–H; 22S–U

Bagauda lucifugus MCATEE AND MALLOCH, 1926, p. 138, fig. 39.

The phallosoma (fig. 22S, T) possesses a narrow dorsal sclerotization, beginning slightly basad of the apex of the struts and with a short apical membranous projection. The phallosoma also has 1+1 superolateral, strongly sclerotized, apically pointed processes not quite equal in size. The phallosoma wall is rather extensively sclerotized at the base of the right side process and less so at the base of the left side process. The endosoma is strongly asymmetrical (fig. 22T).

MATERIAL EXAMINED: Malaya: Batu Cave, Selangor (Biró; Hungarian National Museum), two males; Batu Cave, Selangor, Cavern A, floor, April 4, 1960 (Quate; Bernice P. Bishop Museum), one female; Batu Cave, Selangor, Cavern C, February 22, 1960 (Bernice P. Bishop Museum), one female; Batu Cave, Selangor, Cavern C, at back, April 26, 1960 (Quate; Bernice P. Bishop Museum), one male.

DISTRIBUTION: Malaya.

TYPE: Female, British Museum (Natural History).

Bagauda niger Villiers

Bagauda nigra VILLIERS, 1949a, p. 331, figs. 183–185.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Musée Royal de l'Afrique Centrale.

Bagauda similis, new species

Figure 22A–L, N–R

DESCRIPTION: Male and female: Length to apex of abdomen, 12.5 mm.

General color fuscous to piceous. Fore femur with an incomplete stramineous annulus subapically (fig. 22D). Fore lobe of pronotum on posterior fourth with a stramineous spot of varied extension (small in females, as shown in fig. 22A, occupying whole width of pronotum in male); posterior half of under surface of pronotum also stramineous, this region laterally confluent with light dorsal region in male. Femora-tibial articulation stramineous on mid and hind legs. Forewings lighter brown, with a stramineous spot basad of discal cell, not extending to costal margin (fig. 22A). Surface of body and legs shining, with minute inconspicuous pilosity.

Head and rostrum as shown in figure 22A–C. Interocular furrow carried backward almost to level of posterior border of eyes. Eyes longer than postocular region of head, their distance dorsally in both sexes twice their width; in lateral aspect, eyes almost attaining level of ventral surface of head. Antennae bare in both sexes. Length of first segment of female, 9.5–10 mm.; relative length of segments, 1/0.82/0.3/0.15.

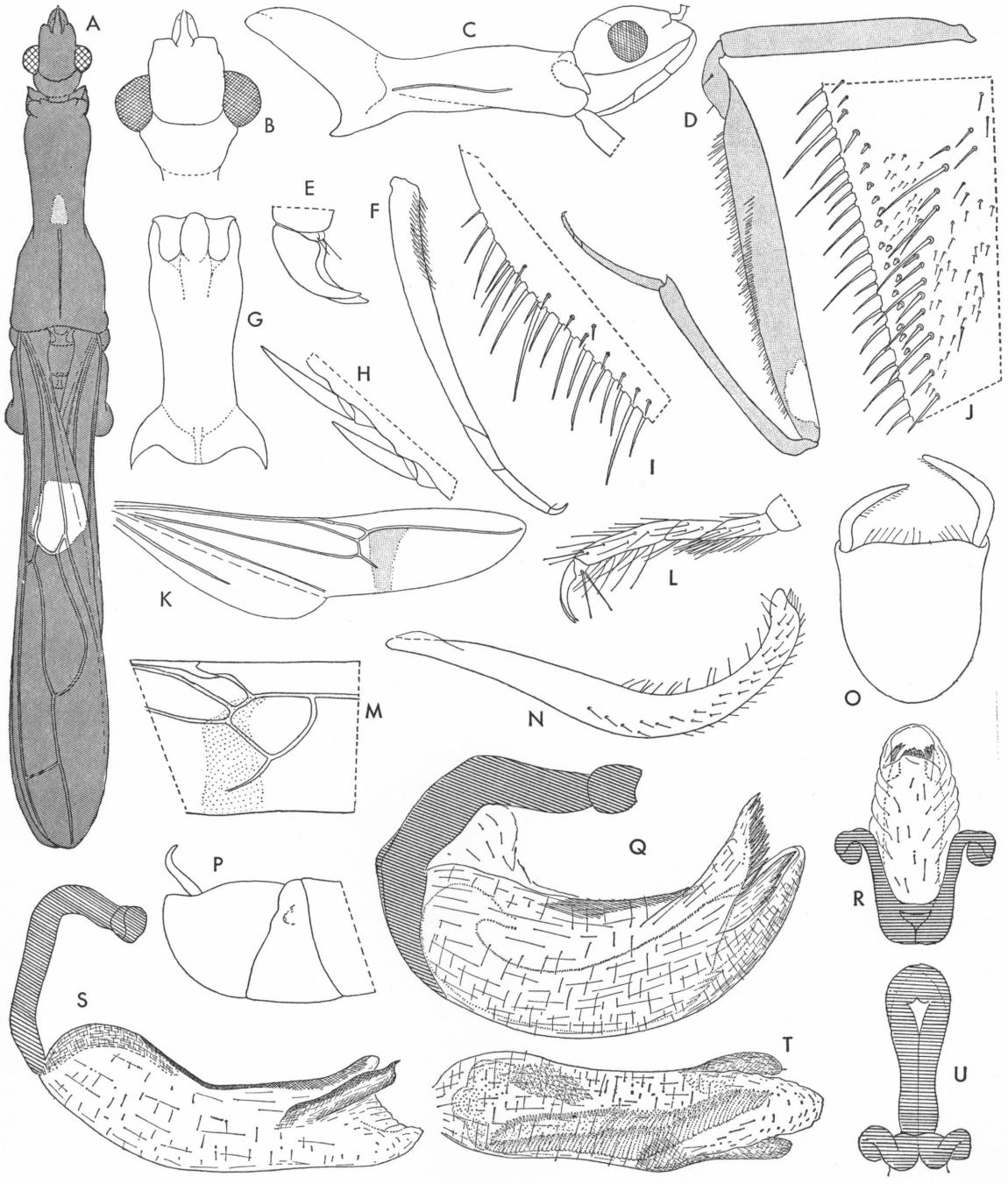


FIG. 22. A–L. *Bagauda similis*. A. General aspect of female. B. Head of male, dorsal view. C. Head and prothorax of female, lateral aspect. D. Foreleg. E. Claws of fore tarsus. F. Fore tarsus. G. Prothorax, seen from below. H. Spines of under surface of fore tibia. I. Detail of under surface of apical portion of femur. J. Detail of basal portion of fore femur. K. Hind wing. L. Posterior tarsus. M. *Bagauda* sp., from Java, detail of hind wing. N–R. *Bagauda similis*. N. Paramere. O. Pygophore, seen from behind. P. Apex of abdomen, lateral view. Q. Phallus, lateral aspect. R. Phallus, posterodorsal view. S–U. *Bagauda lucifugus*. S. Phallus, lateral view. T. Phallosoma, ventral aspect. U. Articulatory apparatus.

Thorax as shown in figure 22A, C, G. Fore lobe of pronotum smooth, hind lobe delicately rugose-punctate, with a distinct, narrow, median, longitudinal ridge evanescent before hind border; posterior two-thirds of fore lobe laterally with a distinct narrow carina. Hind lobe four-fifths as long as fore lobe.

Forelegs as shown in figure 22D–F, H–J. Coxa stout, as long as prothorax along ventral surface. Femur distinctly though not sharply angled ventrally immediately behind base; its length equal to 7.5 times its maximum width. Spinelike setae of under surface slender, not more than half as long as diameter of segment. Spines of base of posteroventral series not distinctly longer or stouter than the remaining, not forming a cluster; accessory series composed of short, peglike spines. Tibia somewhat longer than half of length of femur, on ventral surface with one series of short, inclined spines. Tarsus half as long as tibia; third segment longer than second, their combined length slightly less than half as long as first. Two subequal claws. Mid and hind legs very elongate, hind femora surpassing apex of forewings by 8 mm.; chaetotaxy of femora as in *smithersi* (see fig. 21I); tarsi and claws shown in figure 22L.

Forewings almost (female) or completely (male) attaining apex of abdomen; their venation as shown in figure 22A. Portion of Cu situated between Pcu cross vein and base of discal cell curved toward interior of cell; membrane convex immediately before base of discal cell. Pcu cross vein meeting discal cell almost at level of posterior basal angle of cell; obsolete cross vein connecting basal angle of discal cell to submarginal vein. Portion of vein emitted from apex of discal cell as long as cell. Hind wing as shown in figure 22K.

Abdomen slender.

Male: Hind border of seventh sternite emarginated in ventral view. Posterior and lateral aspects of genital region as shown in figure 22 O, P. Pygophore without posterior process. Parameres slender, their shape and chaetotaxy as shown in figure 22N. Phallus as shown in figure 22Q, R; phallobase distinctly sclerotized.

MATERIAL EXAMINED: India: Bengal: Baigachi, July 14, 1943 [British Museum (Natural History)], one male holotype; Tinnevelly District: Naraikkaddu, March 9, 1936, 2500 to 3000 feet [British Museum (Natural History)], one female allotype; South India: Coimbatore, November 11, 1950 (P. S. Nathan; the American Museum of Natural History), one female paratype.

OBSERVATIONS: The females differ from the male by the extension of the light-colored spot on the pronotum but seem otherwise identical.

This new species approaches *avidus* and *splendens*. However, *avidus* is rather uniformly colored, with concolorous legs, pronotum, and forewings; also in *avidus* the fore lobe of the pronotum is not longer than the hind lobe. *Bagauda splendens* differs from *similis* in several characters, such as its color pattern (fore coxa, trochanter, and base of femur yellowish, fore lobe of pronotum completely yellow, with exception of anterior margin, basal half of forewings light-colored) and several morphological characters (fore femur more salient at base ventrally, fore and hind lobe of pronotum of identical length, cross vein from anterior basal angle of discal cell to marginal vein completely absent, legs much shorter, with hind femur surpassing apex of body by 4 mm. only, and the fore tarsus distinctly longer than half of length of tibia).

Bagauda smithersi, new species

Figure 21A–L, P–X

DESCRIPTION: Male and female: Length of male, 12; of female, 13 mm.

General color pale fuscotestaceous; a dorsal stripe along center of fore lobe of pronotum, carina of hind lobe of pronotum, ventral surface of head and body, fore coxae, trochantera, and basal portion of femora of mid and hind legs all ochraceous. Antennae piceous. Apex of femur and base of tibia of mid and hind legs white. Forewings semihyaline, veins of general body color. Surface of head and body subshining. Pilosity minute, inconspicuous.

Head and rostrum as shown in figure 21A, B. Interocular furrow not attaining level of posterior border of eyes. Sides of head moderately converging posteriorly in dorsal view, abruptly constricted before neck. Eyes longer than sides of postocular region in dorsal view;

their distance dorsally equal to twice their width in male, three times their width in female; oval in lateral aspect, remote from level of dorsal and ventral surfaces of head. Antennae inserted nearer to apex of head than to anterior border of eyes, bare, first segment in male with not very conspicuous longer hairs on basal half. Length of first segment (male), 9.5 mm.; relative length of segments, 1/1/-0.21/0.21.

Pronotum as shown in figure 21A, B. Hind lobe five-sixths as long as fore lobe, with a median longitudinal carina on anterior half. Fore lobe microscopically reticulate, hind lobe delicately rugose-tuberculate.

Forelegs as shown in figure 21C–G. Coxa as long as pronotum along ventral surface. Femur angulate ventrally beyond base, its length equal to 8.5 times its maximum width. Spinelike setae of under surface slender, longest not more than one-half of length of diameter of segment, forming a cluster at base of posteroventral series, rapidly decreasing in size from base to apex of article. Accessory series composed of a single row of very short setae. Tibia five-eighths as long as femur, ventrally with a single series of short, deflexed, spinelike setae (as in *similis;* see fig. 22H). Tarsus seven-tenths as long as tibia, very slender, lacking ventral spinelike setae; second and third segments subequal in size, combined length one-third as long as first. Two subequal simple claws. Mid and hind legs elongate, posterior femur surpassing apex of body by 5 mm. Chaetotaxy of femur as shown in figure 21I; structure of tarsus and claws as in *similis* (see fig. 22L).

Forewings of male attaining apex of abdomen, in female falling somewhat short. Venation as shown in figure 21J. Portion of Cu situated between Pcu cross vein and basal angle of cell, curved toward interior of cell. Pcu cross vein situated slightly basad of level of r–m cross vein, as long as the latter. Portion of M emitted from apex of discal cell two-thirds of length of latter. Venation of hind wing as shown in figure 21H; transverse thickening very weak.

Abdomen slender, rather weakly sclerotized with exception of apex. Chaetotaxy of sternites as shown in figure 21S.

Male: Lateral and posterior aspects of genitalia as shown in figure 21K, L. Posterior process of pygophore well developed, narrowly triangular (fig. 21L). Parameres as shown in figure 21P. Shape and structure of articulatory apparatus and phallus as shown in figure 21Q, R, phallus characterized by 1+1 ventral subapical sclerotized processes of phallosoma and 1+1 projections formed by groups of spinelike processes situated at base of endosoma; structure of endosomal projections as shown in figure 21Q.

Female: Structure of genital region as shown in figure 21V–X; shape and chaetotaxy of gonocoxites, gonapophyses and syngonapophysis as shown in figure 21T, U.

MATERIAL EXAMINED: Rhodesia: Sinoia, in dark cave, March 28, 1959 [C. E. Taylor and C. N. Smithers; British Museum (Natural History)], one male holotype, one female allotype, two female paratypes, (C. E. Taylor and C. N. Smithers; the American Museum of Natural History), one male paratype, one female paratype.

OBSERVATIONS: *Bagauda smithersi*, named for one of its collectors, is very similar to *B. tenebricolus*, a cave-inhabiting species from Tanganyika. In addition to the differences in the wing venation mentioned in the key (this character is absolutely constant in the six specimens of *smithersi* that I have examined), the species differ also in the genitalia: the posterior process of the pygophore of *smithersi* (fig. 21L) is narrower than that of *tenebricolus* (fig. 21M); also, in *smithersi*, the eighth tergite of the female is much smaller than the ninth in lateral view (fig. 21X), whereas both are approximately of the same size in *tenebricolus* (Villiers, 1949, p. 330, fig. 179).

Bagauda splendens Distant

Bagauda splendens DISTANT, 1906, p. 364.
Bagauda decorus BREDDIN, 1909, p. 301.

The above synonymy was established by Distant (1910). I have examined a specimen that is possibly the type of *decorus* and that agrees very well with Distant's description. Some of the more important morphological characters of this species are mentioned in the discussion of *similis*. The pygophore of *splendens* lacks a posterior process, as it does in *similis*.

MATERIAL EXAMINED: *Ceylon:* Weligama (Deutsches Entomologisches Institut), one

female, probably the type of *Bagauda decorus*. *India:* South India: [T. V. Campbell; British Museum (Natural History)], one female, determined by China as *Pleias* (*Bagauda*) *splendens*.

DISTRIBUTION: India; Ceylon.

TYPES: Of *splendens*, British Museum (Natural History); of *decorus*, Deutsches Entomologisches Institut.

Bagauda tenebricolus Horváth

Figure 21M, N

Bagauda tenebricola HORVÁTH, 1910, p. 271.

In this species, the first segment of the fore tarsus is slightly more than three times as long as the second and third combined. The venation of the forewing and the pygophore are here illustrated.

DISTRIBUTION: Tanganyika; Rhodesia.

TYPE: Hungarian National Museum.

Bagauda wagneri Villiers

Bagauda wagneri VILLIERS, 1949a, p. 331, figs. 181, 182.

DISTRIBUTION: South-west Africa.

TYPE: Zoologisches Museum, Hamburg.

BAGAUDELLA MILLER

Bagaudella MILLER, 1952, p. 539.

DESCRIPTION: Macropterous male: Small-sized species (8.5 mm.).

Head and thorax delicately granulose. Color stramineous, suffused with brown, abdomen piceous.

Head fusiform, anteocular portion narrowed, longer than postocular, the latter subsemiglobular, distinctly separated from short neck. Interocular furrow originating at level of posterior border of eyes, curved backward to much behind said level, not forming an incision, thus outline of dorsal surface of head continuous in lateral view. Eyes large. Rostrum straight and slender, not bent between first and second segments, first almost attaining level of anterior, second surpassing level of posterior, border of eyes, third shorter than either first or second. Antennae inserted near anterior border of eyes.

Pronotum complete, covering mesonotum with exception of a small region before scutellum, faintly constricted between fore and hind lobe. Fore lobe subcylindrical, somewhat longer than wide, its sides subparallel, its disc with a delicate, median, longitudinal impression. Hind lobe slightly shorter than fore lobe along its center, slightly wider than long, its sides strongly divergent posteriorly, disc lacking anterior elevations. Scutellum and metanotum lacking processes or spines.

Coxa of forelegs simple. Trochantera with a spiniform seta. Femora ventrally with spiniform setae inserted on short, wartlike protuberances. Posteroventral series beginning at base of article, composed of longer and shorter setae. Anteroventral series beginning beyond basal fourth of article, not interrupted at base, composed of numerous medium-sized and short spiniform setae. Fore tibia somewhat more than half as long as femur. Fore tarsus two-thirds as long as tibia, three-segmented, the two apical segments very short, basal segment about three times as long as second and third combined.

Forewings rather wide apically; discal cell as usual for the tribe, its posterior basal angle connected to submarginal vein by r–m cross vein, Cu approximating but not connected to costal margin basad of discal cell. Rs situated very near apex of wing. Pterostigma carried to wing tip.

Pygophore long and narrow, posterosuperior margin lacking projection. Parameres short, somewhat compressed.

TYPE SPECIES: *Bagaudella whitfieldi* Miller (monobasic).

DISTRIBUTION: Sudan.

OBSERVATIONS: The above description is based on the original description and figures, as no material has been examined in the course of the present work.

As will be seen in the discussion of *Guithera*, the latter genus and *Bagaudella* are closely related, a fact shown by such synapomorphic characters as the peculiar structure of the head and pronotum and details of the venation of the forewings, for example, the position of Rs very near the wing tip.

To judge from its description, the enigmatic *Lethierrya* Puton from Algeria seems to be very much like *Bagaudella* Miller. If the two genera should prove to be synonymous, Miller's species would still stand, as color characters separate the type species of the two genera.

Bagaudella whitfieldi Miller

Figure 34K–O

Bagaudella whitfieldi MILLER, 1952, p. 539, figs. 1A–1F.

Some of Miller's illustrations are reproduced here.

DISTRIBUTION: Sudan.

TYPE: Male, British Museum (Natural History).

BAGAUDINA, NEW GENUS

DESCRIPTION: Macropterous or apterous. Small to medium-sized species (8–12 mm.).

Body surface shining to dull; long hairs absent, but various regions with short, adpressed, wool-like pile. Color uniformly dark, or with conspicuous pattern elements.

Macropterous male: Head rather elongate, fusiform, anteocular region elevated, postocular rounded, strongly convergent toward base in dorsal and lateral views. Interocular furrow not extended behind level of posterior border of eyes. Eyes small, not attaining ventral surface of head. Rostrum slender, straight, not bent between first and second segments; the second not widened, about as long as or distinctly shorter than first, third shorter or slightly longer than first.

Pronotum completely covering mesonotum and scutellum; fore lobe cylindrical, as long as or longer than hind lobe. Scutellum and metanotum lacking processes or spines. Posterior border of prosternum rounded.

Forelegs slender. Coxa and trochanter simple. Femora with two series of slender, spiniform setae inserted on very short protuberances, setae of approximately two sizes, larger ones not longer than diameter of segment. Posteroventral series beginning at base of femur, anteroventral series beginning somewhat distad, not interrupted at base. Fore tibia slightly longer than half of length of femur, its ventral surface with two rows of inclined, spiniform setae. Tarsus less than half as long as tibia, composed of three segments of subequal length; basal half of first segment with a fascia of short, slender setae, rest of first and entire second and third segments each with a double or single series of inclined, spiniform setae. Two subequal simple claws. Mid and hind legs very slender and elongate; femora and tibiae with isolated, short setae of uniform size. Tarsi of mid and hind legs with second and third segments subequal in length, the first slightly shorter. Setae normal, not very numerous. Claws curved, simple.

Forewings with discal cell as usual for the tribe, its anterior and posterior basal angles connected to submarginal vein by distinct cross veins. Pcu+1A joining posterior border of wing as usual, connected to cell by Pcu cross vein. Apex of pterostigma falling considerably short of apex of wing. Area basad of discal cell not convex. Hind wings with hamus approaching Sc+R only gradually, m-cu cross vein perpendicular to longitudinal axis of wing, Cu not extending beyond cross vein.

Abdomen slender, narrow to fusiform, distinctly narrowed at base. Seventh tergite rounded and salient posteriorly, covering base of genital segments. Eighth sternite conspicuously emarginated at sides, dorsal much shorter than ventral portion. Pygophore relatively small, irregularly subsemicircular in lateral view; posterior process slender, spiniform, inserted at or below level of midline of pygophore, in lateral view. Parameres rod-shaped, strongly curved on apical half, rounded distally. Phallus symmetrical. Articulatory apparatus short; basal plates connected for more than half of their length. Phallosoma membranous, with a narrow dorsal and a ventral sclerotization. Endosoma with 1+1 groups of simple, toothlike projections.

Apterous female: General characters like those of macropterous male. Pronotum slender, subcylindrical, longer than mesonotum and metanotum together; mesonotum longer than, metanotum about as long as, wide. Abdomen pedunculate; basal half narrow, cylindrical, apical half fusiform. Eighth tergite extremely short, in shape of a narrow transverse band; ninth tergite large. Gonocoxites separated, very large; syngonapophysis deeply emarginated apically.

TYPE SPECIES: *Bagaudina quatei*, new species.

ETYMOLOGY: From *Bagauda*, a genus of the Emesinae.

DISTRIBUTION: Oriental Region (Philippines; Borneo).

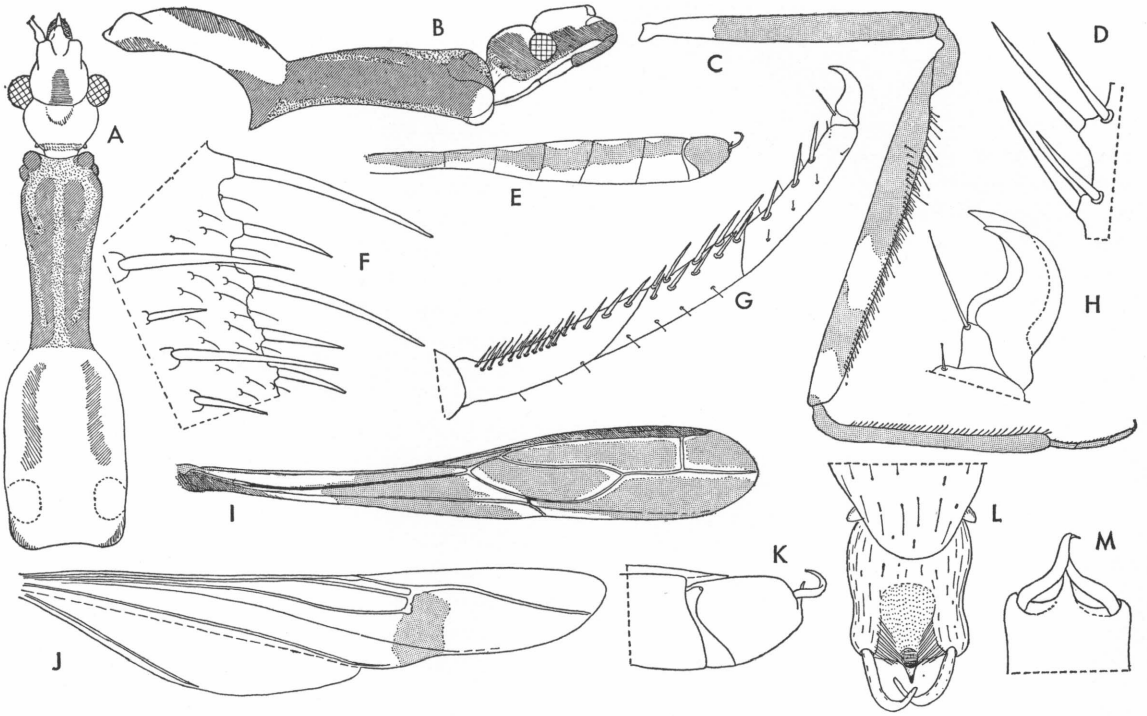


FIG. 23. *Bagaudina sandakanensis*, male. A. Head and pronotum, dorsal view. B. Head and prothorax, lateral aspect. C. Foreleg. D. Spines of under surface of fore tibia. E. Abdomen, lateral view. F. Spines of basal portion of fore femur. G. Fore tarsus. H. Claws of forelegs. I. Forewing. J. Hind wing. K. Apex of abdomen, lateral view. L. Genital region, dorsal aspect. M. Apex of pygophore with parameres, seen from behind.

OBSERVATIONS: The most conspicuous differential characters of *Bagaudina* are mentioned in the generic key; the extension of the pronotum over the scutellum is noteworthy, a feature unique in the Emesinae.

KEY TO THE SPECIES OF *Bagaudina*

1. Color of body and appendages uniformly piceous . . . . . *poiensis*
   Color of body and appendages not uniformly piceous 2
2. First and second rostral segments subequal in length (fig. 23B); fore lobe of pronotum of winged male not distinctly longer than hind lobe (fig. 23A) . . . . . *sandakanensis*
   Second segment of rostrum only half as long as first (fig. 24C); fore lobe of pronotum of winged male much longer than hind lobe (fig. 24A) . . . . . *quatei*

Bagaudina poiensis, new species

Figure 24N–T

DESCRIPTION: Macropterous male: Length to apex of abdomen, 8.6 mm.

Color rather uniformly piceous; rostrum and under surface of anterior portion of head ochraceous; extreme base of fore coxa whitish. Forewings of the general body color, membrane smoky, pterostigma and veins very dark. Apex of hind femora and base of hind tibiae creamy white. Body surface shiny; long hairs absent; short, wool-like pile on under surface of head posteriorly and along anterior border of pronotum dorsally.

Head and rostrum as shown in figure 24N, P. Distance between eyes dorsally distinctly more than twice their width. Elevation behind interocular furrow absent; postocular portion of head not tuberculate laterally. First and second segments of rostrum subequal in length. Length of first antennal segment, 12.5 mm.

Prothorax as shown in figure 24N, P. Posterior portion of anterior lobe shortly carinate laterally; posterior portion of hind lobe of pronotum with 1+1 shallow, lateral impressions and a median longitudinal elevation

(corresponding to underlying scutellum). Fore lobe almost smooth, hind lobe with rather coarse transverse rugosity.

Fore coxa almost as long as pronotum; structure and chaetotaxy of remaining articles of leg (fig. 24 O) much as in *sandakanensis*, but leg more slender. Mid and hind legs very elongate; length of hind femora 13.5 mm., surpassing apex of abdomen by 9 mm.

Shape and venation of forewings much like those of *sandakanensis* (see fig. 23I).

Shape of abdomen like that of *sandakanensis* (see fig. 23E). Lateral aspects of genital region as shown in figure 24Q, pygophore somewhat shorter than that of *sandakanensis*, posterior spine slightly larger. Shape and chaetotaxy of paramere as shown in figure 24R. Basal plates and phallus as shown in figure 24S, T, the latter characterized by 1+1 finger-like processes apically at ventral surface of phallosoma (endosoma partly everted in fig. 24T).

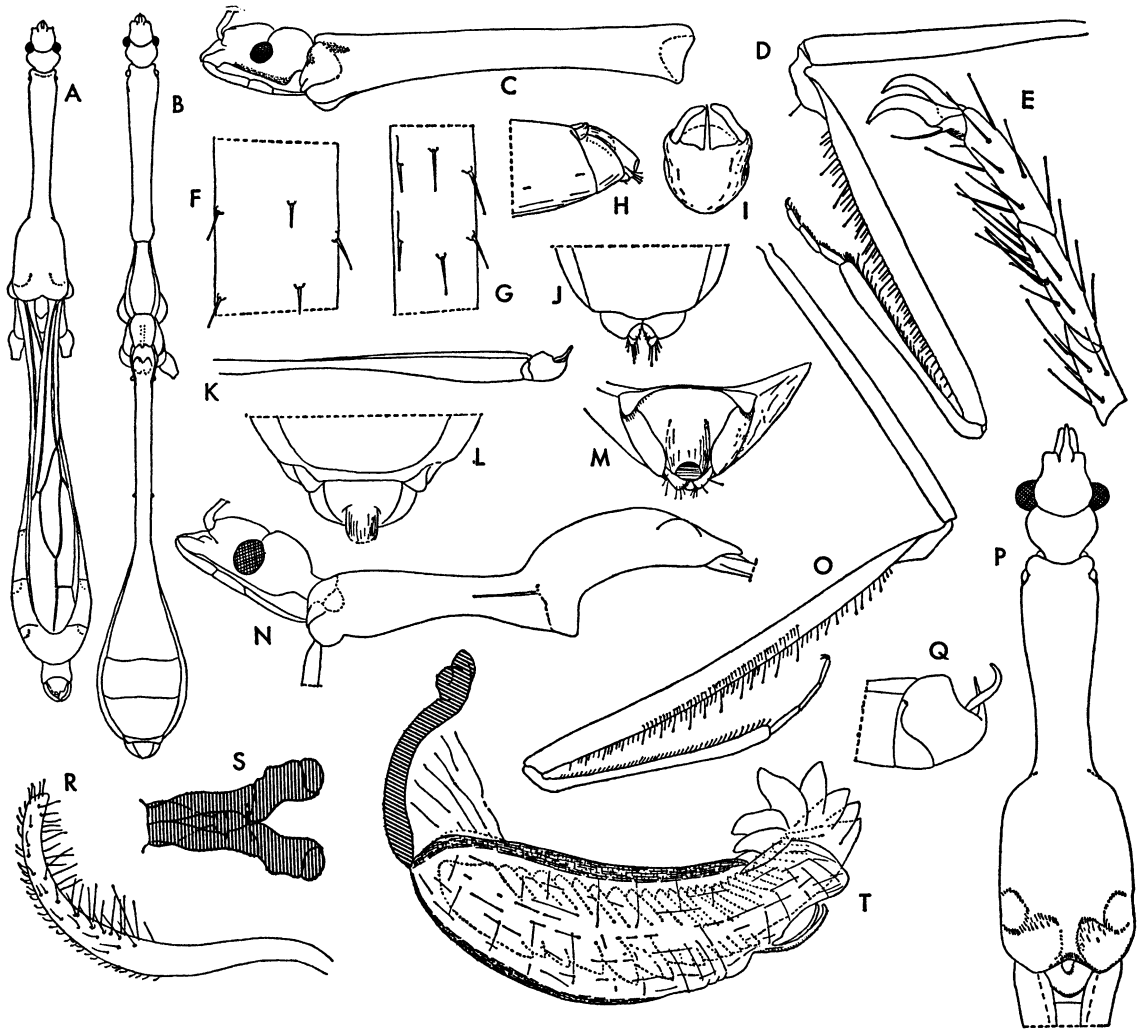


FIG. 24. A–M. *Bagaudina quatei*. A. Male, general aspect. B. Female, general aspect. C. Head and prothorax of female, lateral view. D. Foreleg. E. Posterior tarsus. F. Detail of hind femur. G. Detail of hind tibia. H. Apex of abdomen of female, lateral view. I. Pygophore, seen from behind. J. Genital region of female, ventral aspect. K. Abdomen of male, lateral view. L. Apex of abdomen of female, shown from above. M. Genital region of female, posterior view. N–T. *Bagaudina poiensis*, male. N. Head and prothorax, lateral view. O. Foreleg. P. Anterior portion of body, dorsal view. Q. Genital region, lateral aspect. R. Paramere. S. Articulatory apparatus. T. Phallus, lateral view.

MATERIAL EXAMINED: Borneo: Sarawak, Mt. Poi, 200 feet [E. Mjöberg; British Museum (Natural History)], one male holotype.

OBSERVATIONS: The structural characters that distinguish this species are evident from the description and figures.

Bagaudina quatei, new species

Figure 24A–M

DESCRIPTION: Macropterous male: Length, 11.4 mm.

Head fulvous; region above insertion of rostrum and a lateral longitudinal stripe piceous. Rostrum fulvous at base, stramineous toward apex. Antennae piceous, base and apex of first segment fulvous. Pronotum piceous, hind lobe fulvous above. Mesothorax and metathorax piceous. Forelegs piceous; coxa fulvous toward base, femur with a wide, flavescent annulus basad of middle. Apical half of tibia and third tarsal segment fulvous. Coxae, trochantera, and base of femora of second and third pairs of legs fulvous, rest of legs piceous, femora-tibial articulation of hind legs broadly white. Forewings castaneous, veins broadly margined with flavous; pterostigma fuscous; resulting pattern rather similar to that of *sandakanensis* (see fig. 23I). Abdomen piceous, clouded with ochraceous, especially dorsally on basal half; connexival segments each with an ochraceous spot immediately behind suture. Pygophore and parameres dark. Surface of body subshining; head, fore lobe of pronotum, and abdomen microscopically reticulated; hind lobe of pronotum coarsely and irregularly rugose. Golden, short, adpressed, wool-like pile on under surface of head and thorax, longitudinally along center of dorsal surface of fore lobe of pronotum, laterally on upper portions of mesopleura and metapleura, and medially on metanotum and basal abdominal tergite.

Shape of head as shown in figure 24A; rostrum like that of female (see fig. 24C), with second segment only half as long as first. Postocular region wider than long in dorsal view, lacking projections, its sides regularly rounded. Eyes small; interocular distance equal to about three times their width; remote from level of dorsal and ventral surfaces of head, in lateral view. Antennae bare; length of first segment, 4.5 mm.; relative length of segments of antennae, 1/0.91/0.13/0.16.

Shape of pronotum as shown in figure 24A. Fore lobe sharply carinate laterally on posterior third.

Forelegs as given in generic description and illustrated in figure 24D. Coxa three-fifths as long as fore lobe of pronotum. Trochanter with one distinct spiniform seta. Longer spiniform setae of femur as long as diameter of segment. Length of posterior femur, 12 mm., surpassing apex of abdomen by 6 mm. Chaetotaxy of hind femur and tibia and structure of hind tarsus as shown in figure 24E–G.

Forewings as in generic description and shown in figure 24A, attaining middle of seventh tergite. Hind wings like those of *sandakanensis* (see fig. 23J).

Abdomen as shown in figure 24K, conspicuously widened on posterior third. Pygophore as shown in figure 24I, K; parameres much like those of *poiensis* (see fig. 24R); phallus similar to that of *poiensis* (see fig. 24T).

Apterous female: Length, 12 mm.

Color of head, rostrum, antennae, and legs like that of male, legs somewhat lighter. Thorax and lateral and ventral surface of abdomen piceous; dorsal surface of abdomen castaneous, clouded with ochraceous; connexival spots like those of male. Golden, short, wool-like pubescence as in male but present also along margins of mesonotum and longitudinally along center of dorsum of petiole of abdomen.

Dorsal surface of head and body subshining, microscopically reticulate, posterior portion of pronotum delicately rugose transversely. Lateral and ventral surfaces of mesothorax and metathorax, and ventral surface of abdomen, polished; abdomen ventrally rugulose transversely.

Shape of insect and proportions of different regions as shown in figure 24B. General morphological characters like those of male, eyes slightly smaller. Abdomen narrowly pedunculate on basal half, strongly widened from fourth segment on, widest on sixth. Shape of genital segments as given in generic description and illustrated in figure 24H, J, L, M.

MATERIAL EXAMINED: Philippines: Mindanao: Surigao: Lake Mainit, November 24 to December 1, 1959 (L. W. Quate; Bernice

P. Bishop Museum), one male holotype, one female allotype.

OBSERVATIONS: This species, which is named for its collector, obviously differs from the two remaining species of the genus by the different proportions of the first and second rostral segment, and the very elongate fore lobe of its pronotum.

Bagaudina sandakanensis, new species

Figure 23A–M

DESCRIPTION: Macropterous male: Length of body, 8.9 mm.

Head testaceous; with a spot in front of interocular sulcus dorsally, postocular region laterally and ventrally, and anteocular region on lower half and under surface all dark. First segment of rostrum fuscous, second and third stramineous. Antennae fuscous, luteous at base. Prothorax fuscous, acetabula and posterior lobe of pronotum testaceous, latter with two sublateral, longitudinal, dark stripes on anterior half. Mesothorax and metathorax with scutellum and metanotum fuscous. Forelegs fuscous, base of coxa, one submedian and one apical annulus of femur whitish. Coxae and trochantera of mid and hind legs stramineous, femora light-colored at base, gradually darkened to piceous to shortly before apex, latter broadly white; tibiae white at base, fuscous on remainder. Forewings light brown, some veins and apical part of pterostigma fuscous, part of wing surface whitish (fig. 23I). Abdomen light testaceous, its base below and a lateral fascia on each side fuscous; eighth sternite completely light-colored; pygophore and parameres dark.

Surface of body, antennae, and legs polished, without long hairs. Head ventrally and at hind border, anterior portion of prothorax above, at sides and below, mesothorax and metathorax laterally and ventrally, all with areas of short, stramineous, wool-like pile (figs. 23A, B).

Head and rostrum as shown in figure 23A, B, with low elevation in center behind interocular furrow and 1+1 small, rather pointed tubercles laterally on postocular portion of head. Eyes salient but rather small; their distance dorsally about twice their width; in lateral view, eyes not attaining level of ventral surface of head. Rostrum with first and second segments subequal in length. Antennae bare; length of first segment, 10 mm.; relative length of segments, 1/0.88/0.16/?.

Shape of prothorax as shown in figure 23A, B. Fore lobe about as long as hind lobe, areas not covered by wool-like pile microscopically reticulate-granulate, hind lobe rather conspicuously granulate-rugose.

Forelegs as given in generic description and illustrated in figure 23C, D, F–H. Coxa slightly longer than prothorax ventrally. Spines of femur slightly to considerably shorter than diameter of segment. Spines of ventral surface of tibia slender and elongate. Mid and hind legs extremely slender and elongate, length of hind femora, 12 mm., surpassing apex of forewings by 7 mm.

Shape and venation of fore and hind wings as given in generic description and shown in figure 23I, J, surpassing apex of abdomen by 0.7 mm.

Abdomen as given in generic description and shown in figure 23E. Genital region as shown in figure 23E, K–M. Pygophore with slender, spinelike process posteriorly. Phallus not examined.

MATERIAL EXAMINED: Borneo: North Borneo: Samauranggengle, near Sandakan, July, 1927 [British Museum (Natural History)], one male holotype.

OBSERVATIONS: This species approaches *poiensis* in the proportions of its rostral segments and the pronotum but differs by its conspicuous markings and the structure of the pygophore.

BARROSIA VILLIERS

Barrosia VILLIERS, 1952c, p. 38.

Paraluteva VILLIERS, 1961, p. 43 (new synonymy).

DESCRIPTION: Macropterous or apterous. Small species (6.5–7.5 mm.).

Body surface delicately granulate; long hairs absent. Color uniform, or with simple pattern elements.

Macropterous males and females: Head fusiform, fore and hind lobes moderately elevated, anteocular longer than postocular region, the latter semiglobular in lateral, more or less truncate behind in dorsal, view. Interocular furrow slightly curved only, not extending behind level of posterior border of eyes. Eyes medium-sized to large, in some cases attaining level of under surface of head.

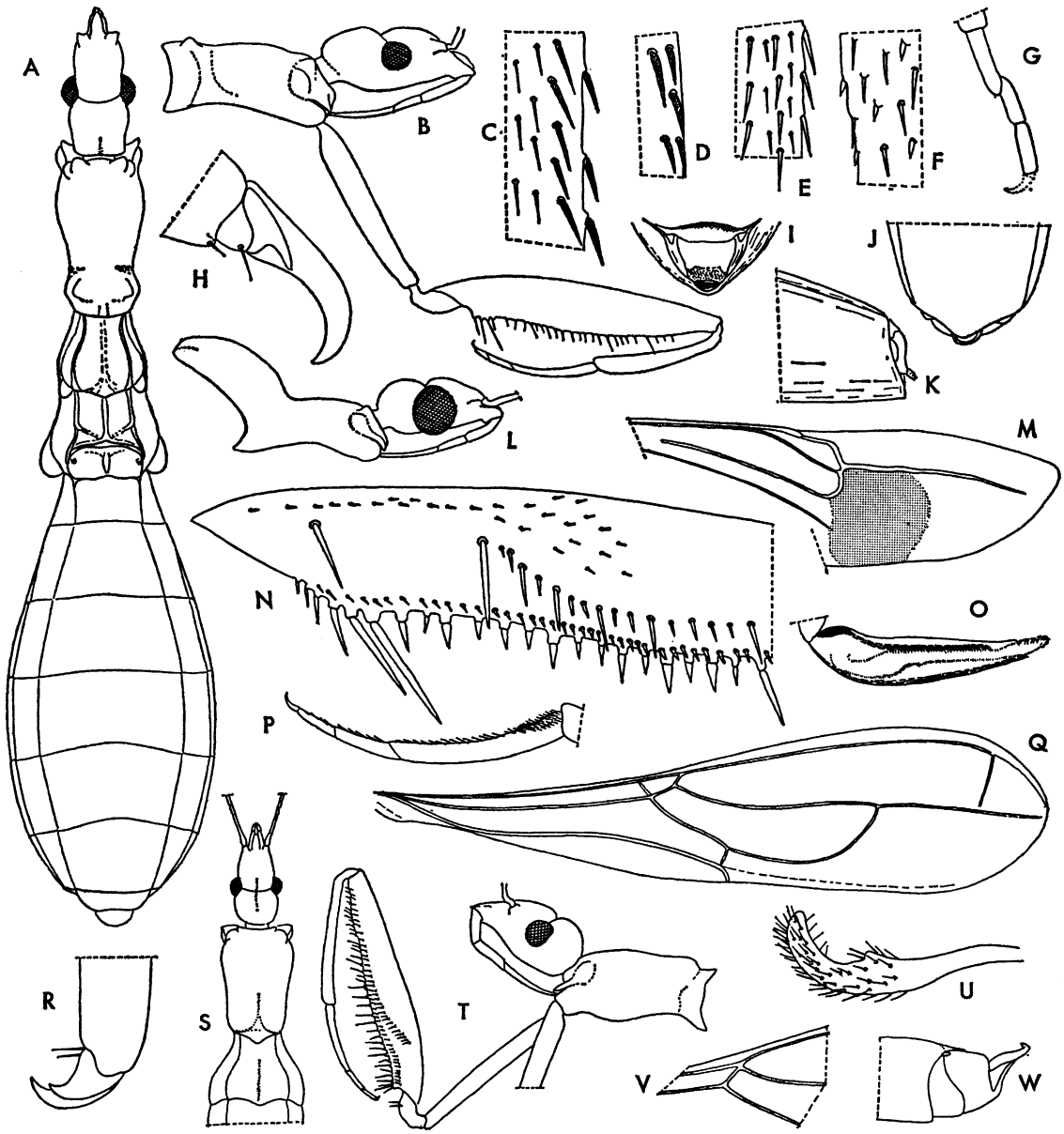


FIG. 25. A–G. *Barrosia binodosa*, female. A. General aspect. B. Anterior portion of body with foreleg, side view. C. Detail of under surface of fore tibia. D. Detail of under surface of fore tarsus. E. Setae of posterior tibia. F. Setae of posterior femur. G. Posterior tarsus, setae and claws not shown. H. *Barrosia minuscula*, claws of foreleg. I–K. *Barrosia binodosa*, female. I. Genital region, posterior view. J. Genital region, ventral aspect. K. Apex of abdomen, side view. L–Q. *Barrosia minuscula*, male. L. Head and prothorax, lateral aspect. M. Hind wing. N. Base of fore femur. O. Phallosoma, side view. P. Fore tarsus. Q. Forewing. R. *Barrosia auraria*, apex of fore tarsus with claws. S, T. *Millotina pauliani*, female. S. Anterior portion of body, dorsal view. T. Head and prothorax with foreleg, lateral aspect. U–W. *Barrosia minuscula*, male. U. Paramere. V. Detail of forewing. W. Apex of abdomen, lateral view. (S and T adapted from Villiers, 1953b.)

Rostrum slender, straight, not bent between first and second segments; first surpassing middle of anteocular region; second slightly shorter than first, third as long as, or longer than, first. Antennal insertion nearer to apex of head than to anterior border of eyes.

Pronotum completely covering mesonotum. Fore lobe subcylindrical, only very slightly narrowed posteriorly, about as long as posterior lobe. Scutellum and metanotum lacking processes or spines. Posterior margin of prosternum rounded.

Forelegs stout. Coxa and trochanter simple. Femur widest at or before middle, with posteroventral, anteroventral, and accessory series all composed of spinelike setae or spines inserted upon short, wartlike bases. Posteroventral series beginning at base of article with a conspicuous group of setae, among which two outstanding long ones, similar larger spines scattered among shorter spines making up most of series. Anteroventral series widely interrupted at base, a single large, spinelike seta basad of interruption, the rest composed of numerous very short and scattered, conspicuously long, spinelike setae. Accessory series composed of single row of minute spines of uniform size. Tibia about half as long as femur, ventrally with one to two series of short spines. Tarsus conspicuously curved, about as long as tibia, three-segmented, first segment equal or nearly equal to twice the length of second and third segments combined; all tarsal segments ventrally with a series of adpressed spiniform setae, first segment at base with a fascia of short bristles. Two claws, either subequal in size or one much shorter than other. Mid and hind legs long, posterior femora surpassing apex of abdomen. Femora with slender bristles and numerous conical spinulets. Tarsi of mid and hind legs slender, first segment longest, third shorter, second shortest. Claws simple.

Forewings with discal cell as usual for tribe, its posterior basal angle connected to submarginal vein either directly or by a short cross vein. Apex of pterostigma almost or completely attaining wing tip. Hind wings with hamus angling rather sharply toward Sc+R; Cu not extending beyond cross vein. Transverse thickening well developed.

Abdomen fusiform, widest on posterior third.

Male: Eighth sternite large. Pygophore short, a long, subvertical, spiniform projection arising from its inferoposterior border. Parameres large, slender. Phallobase very slender, membranous. Endosoma symmetrical, with the usual spinelike projections.

Apterous male and female: General characters like those of macropterous form. Eyes small. Pronotum short, not covering mesonotum, subcylindrical, about twice as long as wide. Mesonotum half as long as pronotum, widened posteriorly; metanotum subquadrate.

Abdomen fusiform. Genitalia of male like those in winged form. Eighth tergite of female very short, transverse; ninth vertical, subrectangular, wider than long; seventh sternite covering gonocoxites and gonapophyses almost completely.

TYPE SPECIES: Of *Barrosia*, *B. colorata* Villiers (original designation); of *Paraluteva*, *P. binodosa* Villiers (monobasic).

DISTRIBUTION: Ethiopian Region.

OBSERVATIONS: Villiers (1961), when he described *Paraluteva*, was obviously not aware of the great similarity between *Paraluteva* and his *Barrosia* described several years previously (Villiers, 1952c). Nothing in his descriptions or drawings will separate the two genera; hence the above synonymy. *Barrosia* and *Paraluteva* were described from apterous specimens only. An evaluation of the chaetotaxy and structure of the forelegs and of the shape of the external male genitalia makes it obvious that certain species known from the winged form only and described under *Bagauda* belong in *Barrosia*, in which they are now placed.

KEY TO THE SPECIES OF *Barrosia*

1. Apterous (fig. 25A) 2
   Macropterous 4
2. Pronotum posteriorly with 1+1 distinct protuberances (fig. 25A, B) . . . . *binodosa*
   Pronotum lacking said protuberances . . . 3
3. Length, 6.5 mm.; head testaceous . . *nuda*
   Length, 5 mm.; head piceous . . . *colorata*
4. Vein emanating from apex of discal cell of forewing three-fourths as long as cell (fig. 25Q); fore tarsi with one large and one very small claw (fig. 25H); connexivum concolorous;

mid and hind femora whitish apically . . . . . *minuscula*

Vein emanating from apex of discal cell less than half as long as discal cell; claws of fore tarsi subequal in size (fig. 25R); connexivum with alternating dark and light spots; mid and hind femora uniformly dark . . . . . *auraria*

Barrosia auraria (Wygodzinsky), new combination

Figure 25R

Bagauda aurarius WYGODZINSKY, 1958b, p. 331, figs. 1–7.

DISTRIBUTION: Gold Coast.

TYPE: Female, British Museum (Natural History).

Barrosia binodosa (Villiers), new combination

Figure 25A–G, I–K

Paraluteva binodosa VILLIERS, 1961, p. 44, figs. 19, 20.

The species is illustrated here in some detail. The claws of the forelegs are exactly like those of *minuscula* (fig. 25H).

Available evidence points to the possibility that this is the apterous female of *minuscula*, a species known from macropterous males only, but color characters do not agree completely. Villiers (1961) reported both species from one and the same locality (Kakontwe Cave, Jadotville, Katanga).

MATERIAL EXAMINED: Tanganyika: 31 miles southwest of Korogwe, November 12, 1957, 1020 meters (E. Ross; the California Academy of Sciences), one female.

DISTRIBUTION: Congo (Léopoldville); Tanganyika.

TYPE: Female, Musée Royal de l'Afrique Centrale.

Barrosia colorata Villiers

Barrosia colorata VILLIERS, 1952c, p. 38, figs. 26–28.

DISTRIBUTION: Angola.

TYPE: Female, Muséum National d'Histoire Naturelle.

Barrosia minuscula (Villiers), new combination

Figure 25H, L–Q, U–W

Bagauda minuscula VILLIERS, 1949a, p. 332.

The drawings presented here are taken from data offered by Wygodzinsky (1958a) on this species.

DISTRIBUTION: Mozambique; Malawi; Rhodesia; Transvaal; Congo (Léopoldville).

TYPE: Male, Muséum National d'Histoire Naturelle.

Barrosia nuda (Miller)

Ploearia nuda MILLER, 1950, p. 191, figs. 3a–3e.
Barrosia nuda: VILLIERS, 1952c, p. 37.
Ploearia (Luteva) nuda: MILLER, 1953, p. 563.

DISTRIBUTION: Rhodesia.

TYPE: Male, British Museum (Natural History).

BETTYELLA, NEW GENUS

DESCRIPTION: Macropterous or apterous. Medium-sized species (11–14 mm.).

Body surface slightly shining, from smooth to minutely reticulate; long hairs absent. Color almost uniform, without distinctive pattern.

Macropterous male: Head fusiform, fore and hind lobes moderately convex, anteocular region slightly longer than postocular, the latter with sides strongly converging posteriorly in dorsal view, slightly constricted at middle. Portion of head situated before antennal insertions very slender. Interocular furrow arising from level of center of eyes, only slightly curved, not attaining level of posterior border of eyes. Eyes from medium-sized to large, in some cases approaching level of under surface of head. Rostrum slender, distinctly bent between first and second segments; two basal segments subequal in length, first attaining level of antenniferous tubercles, second not surpassing level of anterior margin of eyes; third much longer than first and second combined. Antennae inserted at middle of anteocular region.

Pronotum completely covering mesonotum. Fore lobe subcylindrical, slightly narrowed posteriorly, about as long as hind lobe, the latter subrectangular, with sides faintly diverging posteriorly. Scutellum and metanotum lacking processes or spines. Posterior margin of prosternum rounded.

Forelegs slender. Coxa and trochanter glabrous. Femur slightly S-shaped, virtually parallel-sided, with posteroventral, anteroventral, and accessory series all composed of slender, spinelike setae inserted on short, wartlike bases. Posteroventral series beginning some distance from base of article with

a conspicuous group of setae, some longer than any other setae of the femur, the latter setae medium-sized and short. Anteroventral series widely interrupted at base, a single seta basad of interruption, the rest of series composed of medium-sized, short, and very short setae. Accessory series consisting of a row of minute spinulets. Tibia about one-third as long as femur, its under surface with one series on deflected spines. Tarsus slightly longer than tibia, both combined about two-thirds as long as femur. Tarsus slightly curved, three-segmented, first segment three times as long as second and third combined, the two latter subequal in length; all tarsal segments ventrally with two rows of short denticles or spines; first segment with a fascia of short bristles at base. One large and one very small obsolete claw. Mid and hind legs long, femora surpassing apex of abdomen. Femora and tibiae with short setae of uniform size. Tarsi of mid and hind legs slender, first segment longest, third shorter, second shortest; first segment on apical half of under surface with a group of capitate setae. Claws simple.

Forewings with discal cell very long and narrow, about 10 times as long as wide, its apex close to wing tip. Posterior basal angle of discal cell connected directly to submarginal vein, anterior basal angle connected to marginal vein by an oblique cross vein. P-cu cross vein situated much beyond level of posterior basal angle of cell. Pterostigma approaching but not attaining wing tip. Hind wings not examined.

Abdomen elongate, narrow, widest on posterior third. Sternites with microchaetae and macrochaetae.

Eighth sternite band-shaped, completely exposed. Seventh tergite rounded behind. Anterior dorsal bridge of pygophore large; inferoposterior border of pygophore with a well-developed, upwardly directed, narrow projection. Parameres large, slender. Articulatory apparatus short. Phallobase membranous, with a well-developed ventral and a small dorsal sclerotization. Struts fused for most of their length, forming a slender, rod-shaped sclerite; struts slightly separated only on apical third. Endosoma apparently symmetrical, with numerous spinelike projections, as usual for the tribe.

Apterous female: General characters like those of winged male.

Eyes small. Pronotum not covering mesonotum, elongate, subcylindrical, more than three times as long as wide; hind lobe not distinct. Mesonotum about half as long as pronotum, convex, delicately sulcate longitudinally along middle. Metanotum about half as long as mesonotum, slightly longer than wide, its disc flat, carinate longitudinally along middle.

Abdomen elongate, fusiform, narrow at base, widest behind middle. Eighth tergite shorter than wide, subhorizontal; ninth tergite subhorizontal or inclined posteriorly, trapezoidal, about as long as wide. Seventh sternite normally developed; gonocoxites large; syngonapophysis large, salient.

TYPE SPECIES: *Bettyella marita*, new species.

ETYMOLOGY: Named for my wife Betty.

DISTRIBUTION: Madagascar.

OBSERVATIONS: *Bettyella* seems to belong to a group of genera consisting of *Bagauda*, *Barrosia*, and *Millotina*. The last-named genus is restricted to Madagascar; *Barrosia* occurs only on the African mainland; and *Bagauda*, on the African mainland and in the Oriental Region. *Bettyella* is distinguished from the other three genera by the relatively very short first and second rostral segments, with the apex of the second not attaining the level of the anterior margin of the eyes, by the posteroventral series of the fore femur which begins a considerable distance from the base of the article, and, in its winged form, by the very long discal cell which closely approaches the wing tip. Numerous other features distinguish *Bettyella* from the genera enumerated. It differs from *Bagauda* by the basally interrupted anteroventral series of the fore femur, the fact that the fore tarsus is longer than the tibia and bears denticles or spines along its whole under surface, and the obsolete second claw of the fore praetarsus. Although *Bettyella* agrees with *Barrosia* in the interruption of the anteroventral series of the fore femur, it differs from *Barrosia* by the much shorter combined length of the fore tibia and tarsus, the fact that the fore tarsus is distinctly longer than the tibia, and that the whole under surface bears denticles or spines; furthermore, the postocular

FIG. 26. *Bettyella marita*. A. Female, general aspect. B. Male, general aspect. C. Anterior portion of body of male, lateral view. D. Head and prothorax of female, lateral aspect. E. Prothorax of male, seen from below. F. Foreleg of male. G. Base of fore femur. H. Praetarsus of foreleg with claws. I. Spiniform setae of under surface of fore tibia. J. Spines of under surface of fore tarsus. K. Tarsus of hind leg. L. Detail of posterior femur. M. Apex of abdomen of male, dorsal view. N. Genital segments of male, side view. O. Apex of pygophore, lateroventral view, as seen in slide preparation. P. Pygophore, posterior view. Q. Paramere. R. Phallus, lateral aspect. S. Apex of abdomen of female, seen from above. T. Genital region of female, side view. U. Struts and dorsal sclerotization of phallosoma.

region of the head is shaped differently in the two genera. The apterous form of *Bettyella* differs from that of *Barrosia* also by its elongate prothorax. The comparison of *Bettyella* and *Millotina* can be based only on the apterous morph, as winged forms of *Millotina* are unknown. *Bettyella* can be distinguished from *Millotina* by the differently shaped postocular region of the head, the presence of a basal interruption of the anteroventral series of the fore femur, the much shorter combined length of the fore tibia and tarsus, and the

much longer pronotum, in addition to other features.

KEY TO THE SPECIES OF *Bettyella*

1. Femora of mid and hind legs broadly piceous apically (fig. 27L) . . . . . *scitula*
   Femora of mid and hind legs broadly whitish apically (fig. 27C) 2
2. Over-all color of head and thorax luteous; abdomen of female narrow, the dark dorsal stripe narrower than distance from stripe to abdominal margin (fig. 26A) . . . *marita*
   Over-all color of head and thorax castaneous to piceous; abdomen of female strongly widened on apical half, the dark stripe along its dorsum wider than distance from stripe to abdominal margin (fig. 27D) . . *tornatula*

Bettyella marita, new species

Figure 26A–U

DESCRIPTION: Macropterous male: Length to apex of abdomen, 11.2–11.4 mm. General aspect as shown in figure 26B.

General color luteous. Antennae of general color, first article slightly darkened distally, very narrowly white at apex. Metanotum piceous; abdomen slightly darkened. Forelegs in some cases darkened except base of coxa and apex of femur; a broad apical annulus on femora of mid and hind legs and a narrow basal one on tibiae, both whitish. Forewings concolorous. Abdomen dorsally along middle with a narrow black stripe.

Head and rostrum as given in generic description and shown in figure 26B, C. Eyes very large, their distance dorsally equal to their width, in lateral aspect attaining level of ventral, and almost that of dorsal, surface of head. First and second antennal segments with a moderate number of very long hairs. Length of first segment, 8 mm.; relative length of segments, 1/0.9/0.2/0.15.

Shape of prothorax as shown in figure 26B, C. Surface of hind lobe not forming an angle with that of fore lobe in lateral view; surface of pronotum subshining, hind lobe faintly rugose.

Shape and structure of forelegs as given in generic description and illustrated in figure 26F–J. Coxae almost as long as pronotum. Femur approximately 13 times as long as its maximum width. Distance from base of femur to beginning of series equal to twice width of femur. Posteroventral series generally composed of three large, basal, spinelike setae followed by 40 to 50 medium-sized, small, and very small, spinelike setae extending to apex of segment. Basal seta of anteroventral series situated at level of base of posteroventral series, the interruption of anteroventral series as wide as distance from base of femur to beginning of posteroventral series; remainder of anteroventral series consisting of approximately 35 medium-sized and small, spinelike setae. Accessory series composed of about 30 spinulets, becoming distinct at level of start of apical portion of anteroventral series and not attaining apex of segment. Under surface of tibia with about 25 spines, becoming progressively larger from base to apex of article; shaped as shown in figure 26I. Spines of under surface of tarsus as shown in figure 26J; claws as shown in figure 26H. Mid and hind legs as given in generic description; posterior femora surpassing apex of abdomen by 3.0 to 3.5 mm. Chaetotaxy of mid and hind femora and tibiae as shown in figure 26L; structure and chaetotaxy of tarsi as shown in figure 26K.

Forewings as given in generic description and illustrated in figure 26B, falling about 1 mm. short of apex of abdomen, slightly less than nine times as long as maximum width. Distance from anterior basal angle of discal cell to Pcu cross vein equal to three times the length of portion of M forming base of discal cell.

Abdomen as given in generic description; its chaetotaxy as shown in figure 26 O. Genital segments as shown in figure 26M–P. Posterior process of pygophore (fig. 26 O, P) narrowly band-shaped, setose. Parameres as shown in figure 26M, P, Q. Phallus as shown in figure 26R; dorsal sclerotization of phallobase and struts as shown in figure 26U.

Apterous female: Length to apex of abdomen, 9.4–10.0 mm.; head, 0.8; thorax, 2.7; abdomen, 6.5 mm. General aspect shown in figure 26A.

General color scheme like that of male; black longitudinal band on dorsum of abdomen narrow, its width on posterior portion of abdomen less than distance from band to connexival margin.

General structural characters as given in generic description. Head as shown in figure 26A, D. Eyes small, their distance dorsally slightly more than twice their width, remote

from level of dorsal and ventral surface of head in lateral view. Antennae glabrous; length of first segment, 7 mm.; relative length of segments, 1/0.85/0.19/0.18.

Shape of thorax as shown in figure 26A, D. Forelegs like those of male, but femur not more than 10 times as long as maximum width. Mid and hind legs like those of male.

Abdomen long and narrow (fig. 26A), its maximum width equal to one-thirteenth of its length. Segmental limits not distinct except on apical portion of abdomen. Genital region as shown in figure 26S, T; eighth tergite simply rounded behind; ninth slightly concave.

MATERIAL EXAMINED: Madagascar: Périnet, December, 1932, February 26 to March 12, 1935 (Olsufiev; Zoological Institute of the Academy of Sciences, Leningrad), one male holotype, one female allotype, seven male and two female paratypes; (Olsufiev; the American Museum of Natural History), one male and one female paratype; Ambontoaka, February 4 to 14, 1934 (Olsufiev; Zoological Institute of the Academy of Sciences, Leningrad), one male; Analamosotra, near Périnet, February, 1932 (Olsufiev; Zoological Institute of the Academy of Sciences, Leningrad), one female paratype.

Bettyella scitula, new species

Figure 27G–M

DESCRIPTION: Macropterous male. Length to apex of abdomen, 10.7 mm. General aspect much like that of *B. marita* (fig. 26B) but somewhat stouter.

General color castaneous. Clypeus ochraceous; rostrum ochraceous. Antennae castaneous, basal tenth of first segment ochraceous. Thorax of general body color, inferolateral border of hind lobe of pronotum, as well as all acetabula, ochraceous. Coxa and trochanter of forelegs ochraceous; femur fuscous, with two wide, submedian annuli faintly ochraceous; tibia and tarsus fuscous. Mid and hind legs ochraceous, apices of femora widely (fig. 27L), and bases of tibiae narrowly, fuscous. Forewings fuliginous. Abdomen fuscous.

Head and rostrum as shown in figure 27G, H. Eyes medium-sized, their distance dorsally equal to one and one-half times their width, not attaining level of dorsal and ventral surface of head in lateral view. First and second antennal segments with a moderate number of very long hairs. Length of first segment, 9.3 mm.; relative length of segments, 1/0.85/-0.18/0.14.

Shape of prothorax as shown in figure 27G, H; surface of hind lobe of pronotum forming a distinct angle with that of fore lobe in lateral view. Surface of pronotum subshining, that of hind lobe minutely and irregularly rugose.

Shape and structure of forelegs (figs. 27H, J) much like those of *marita*. Coxa distinctly shorter than pronotum. Femur 12 times as long as its maximum width. Distance from base of femur to beginning of series equal to twice the width of article. Posteroventral, anteroventral, and accessory series all like those of *marita*. Chaetotaxy of tibia and tarsus (fig. 27J) and structure of claws like those of *marita*. Posterior femora surpassing apex of abdomen by 4 mm.; chaetotaxy of femora and tibiae of mid and hind legs as in *marita*; structure and chaetotaxy of tarsi as shown in figure 27K.

Forewings attaining apex of abdomen, slightly more than seven times as long as their maximum width; venation much like that of *marita*, but distance from anterior basal angle of discal cell to Pcu cross vein equal to four times the length of portion of M forming base of discal cell (fig. 27I).

Abdomen as given in generic description. Genital segments as shown in figure 27M; posterior process of pygophore much like that of *marita* but almost glabrous; parameres like those of *marita*.

MATERIAL EXAMINED: Madagascar: Fanovana, 25 kilometers west of Périnet, July 2–4, 1933 (Robinson; Zoological Institute of the Academy of Sciences, Leningrad), one male holotype; Fanovana, March 10, 1934 (Robinson; Zoological Institute of the Academy of Sciences, Leningrad), one male paratype; Fanovana, March 9, 1934 (Robinson; the American Museum of Natural History), one male paratype.

OBSERVATIONS: The male of *Bettyella scitula* differs from that of *marita* by its much darker color, the presence of dark apical annuli on the mid and hind femora, the smaller eyes, somewhat differently shaped pronotum,

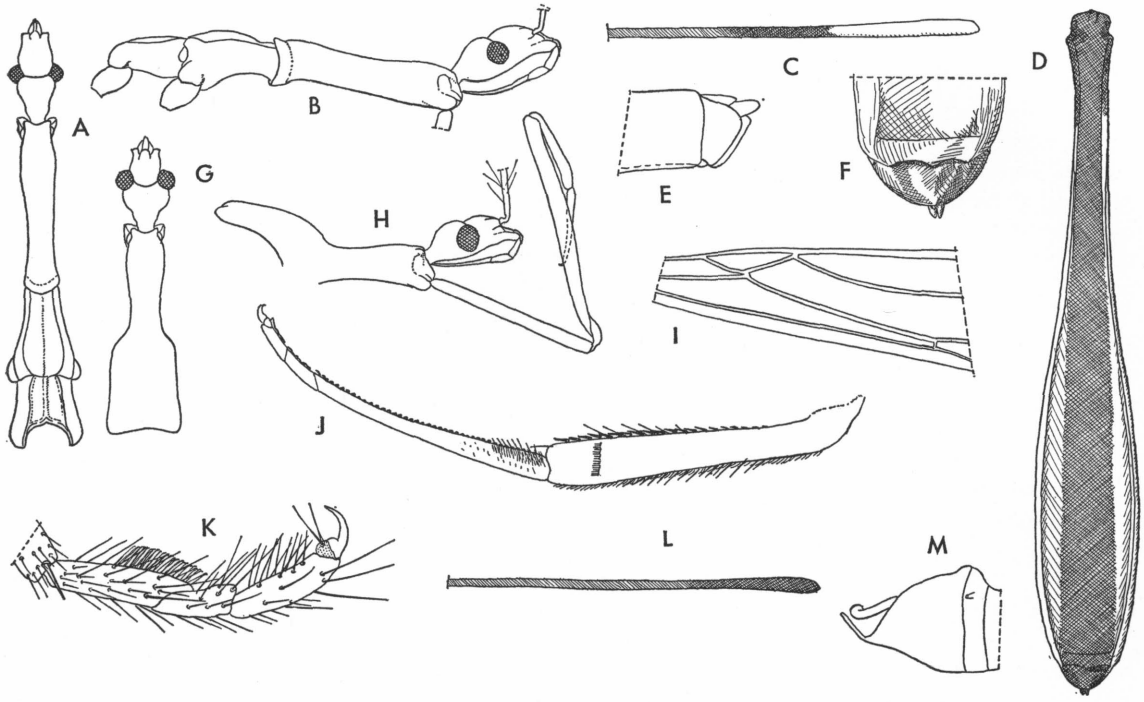


FIG. 27. A–F. *Bettyella tornatula*, female. A. Head and thorax, seen from above. B. Head and thorax, lateral view. C. Apex of hind femur, with color pattern. D. Abdomen, dorsal view. E. Apex of abdomen, lateral aspect. F. Genital region, dorsal view. G–M. *Bettyella scitula*, male. G. Head and prothorax, seen from above. H. Anterior portion of body, lateral view. I. Portion of forewing. J. Tibia and tarsus of foreleg. K. Posterior tarsus. L. Apex of hind femur, with color pattern. M. Genital region, lateral aspect.

the relatively longer forewings, and differences in the wing venation as described above.

Bettyella tornatula, new species

Figure 27A–F

DESCRIPTION: Apterous female: Length to apex of abdomen, 13.0 mm.; head, 1.3; thorax, 3.7; abdomen, 8.0 mm. General aspect like that of *B. marita*, but abdomen much wider.

Head and thorax castaneous, prothorax piceous above and laterally, with exception of the very short posterior lobe, mesonotum and metanotum piceous on disc. Head with rostrum and antennae of general body color, first antennal segment with a wide apical annulus piceous. Forelegs ochraceous, tibia and tarsus darkened. Mid and hind legs ochraceous; femora with a broad apical annulus (fig. 27C) and tibiae with a narrow subapical annulus whitish, the white annulus of femur preceded by a not very sharply limited piceous one. Abdomen ochraceous, dorsal surface longitudinally along middle with a broad black band (fig. 27D) which is wider than the distance from band to connexival margin; dark band occupying whole width of abdomen on the basal seventh and on genital region; light-colored lateral portion of abdomen and its ventral surface very faintly banded transversely with dark on half of each segment.

General structural characters as given in generic description and like those of remaining species. Head as shown in figure 27A, B. Eyes small, their distance dorsally equal to twice their width, remote from dorsal and ventral surface of head in lateral view. Antennae glabrous; length of first segment, 9.3 mm.; relative length of segments, 1/0.9/0.17/-0.17.

Shape of thorax as shown in figure 27A, B. Structure and chaetotaxy of forelegs as in *scitula;* fore femur 10 times as long as maximum

width. Mid and hind legs like those of remaining species.

Abdomen very narrow on basal fourth, gradually widening posteriorly, its maximum width equal to one-sixth of its length. Segmental limits not distinct except on apical portion of abdomen. Genital region as shown in figure 27D–F; eighth tergite salient at center behind, ninth convex on disc, depressed laterally.

MATERIAL EXAMINED: Madagascar: Fanovana, 25 kilometers west of Périnet, March 10, 1934 (Robinson; Zoological Institute of the Academy of Sciences, Leningrad), one female holotype.

OBSERVATIONS: Though there exists a certain over-all similarity between *tornatula* (known only from the female) and *scitula* (described from a male), both of which have been collected at the same locality though not at the same time, the two specimens are herein considered as belonging to different species, mainly because of the very differently colored mid and hind legs. The female of *tornatula* can be distinguished from that of *marita* by its darker over-all color, the relatively broader dark stripe on the abdominal dorsum, and the differently shaped abdomen, in addition to minor differences.

GNOMOCORIS McATEE AND MALLOCH

Ploiaria (*Gnomocoris*) McATEE AND MALLOCH, 1926, p. 139.

DESCRIPTION: Macropterous female: Small size (6 mm.).

Body surface shining. Color brown, body and appendages with yellowish pattern elements arranged in dots and spots.

Head fusiform, anteocular portion longer than postocular, the former narrowed toward apex, the latter rounded behind in dorsal view, dorsally with a conspicuous median projection. Interocular furrow originating at level of center of eyes, backwardly curved but not attaining level of posterior border of eyes. Rostrum straight; first segment cylindrical, not attaining level of center of anteocular region; second somewhat shorter than first, attaining level of anterior border of eyes, distinctly swollen; third slender, slightly longer than first and second combined. Eyes large. Antennae inserted somewhat before center of anteocular region.

Pronotum not covering mesonotum, much longer than wide, conspicuously constricted at level of center of fore lobe, the latter dorsally with 1+1 spinelike projections. Mesonotum subrectangular, somewhat longer than wide; disc sulcate longitudinally along middle, with 1+1 prominent conical projections before hind margin. Scutellum and metanotum each with a long spine. Posterior border of prosternum emarginated.

Forelegs slender. Coxa with corrugate outlines; coxa and trochanter without spines. Femur somewhat constricted beyond base, slightly S-shaped, ventrally with two series of relatively short, spinelike setae inserted on low, wartlike bases. Posteroventral series beginning at base of segment, basal spines longest, inserted on more conspicuous protuberances. Anteroventral series interrupted at base, a single seta basad of interruption. Tibia stout, half as long as femur, its under surface with two series of short, inclined, spinelike setae. Tarsus three-fifths as long as tibia, three-segmented; first segment slightly longer than the two remaining combined, the latter subequal in length. Under surface of tarsus with short, adpressed, spinelike setae. Two claws, one much longer than the other.

Venation of forewings as usual for the tribe. Anterior and posterior basal angles of discal cell each connected to costal margin by a cross vein. M+Cu very close to costal margin basad of cell. Pterostigma approaching wing tip. Hind wing with transverse thickening.

Connexival margins of abdomen lobate.

TYPE SPECIES: *Ploiaria* (*Gnomocoris*) *spinosa* McAtee and Malloch (monobasic).

DISTRIBUTION: Borneo.

OBSERVATIONS: The swollen second rostral segment, the presence of spines on the scutellum and metanotum, and the lobate connexival margins seem sufficient grounds to consider *Gnomocoris* as a valid genus.

McAtee and Malloch (1926) erred in describing a spine on the basal abdominal segment; it belongs to the metanotum.

Gnomocoris spinosus McAtee and Malloch

Figure 28A–H

Ploiaria (*Gnomocoris*) *spinosa* McATEE AND MALLOCH, 1926, p. 141, figs. 36, 43.

The illustrations given here were made

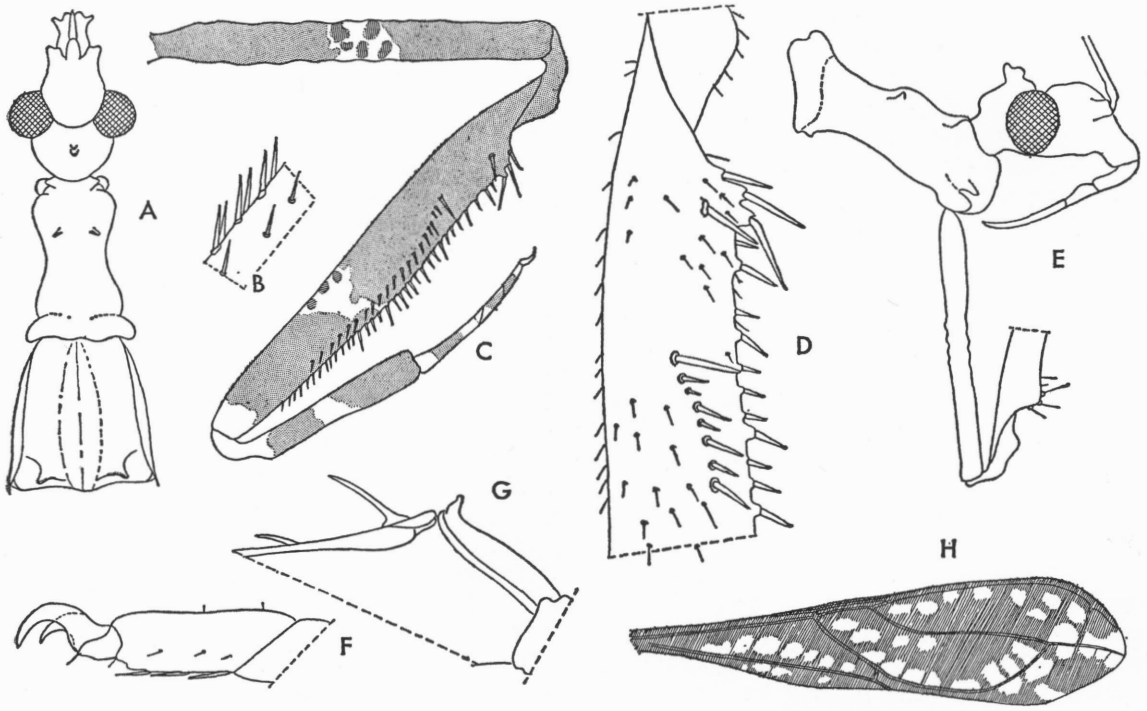


FIG. 28. *Gnomocoris spinosus*, female. A. Anterior portion of body, dorsal view. B. Spiniform setae of under surface of fore tibia. C. Foreleg, with color pattern shown. D. Base of fore femur. E. Anterior portion of body, side view. F. Apical segment of fore tarsus with claws. G. Mesonotum and metanotum, lateral view. H. Forewing, with color pattern shown.

from the type, the only specimen so far known.

DISTRIBUTION: Borneo.

TYPE: Female, United States National Museum.

GOMESIUS DISTANT

Algol KIRKALDY, 1901, p. 54 (preoccupied by *Algol* Sollas, 1888, in sponges).

Gomesius DISTANT, 1903e, p. 212.

Isachisme KIRKALDY, 1904, p. 280.

DESCRIPTION: Macropterous. Large-sized species (20–25 mm.).

Body surface from dull to subshining, smooth, covered with minute, almost imperceptible pile. Color from ochraceous to piceous, pattern elements inconspicuous, consisting mostly of small, irregularly arranged spots and stripes.

Head elongate, fusiform in lateral view, anteocular longer than postocular portion, the latter with sides strongly converging posteriorly in dorsal and lateral views. Interocular furrow shallow, not distinctly perceptible in lateral view, originating near or at level of posterior border of eyes, conspicuously backwardly curved, generally surpassing, but in some cases only attaining level of, posterior border of eyes. Eyes medium-sized to large. Rostrum slender, straight, not bent between first and second segments, these of subequal length, third about as long as first two combined; first at most attaining center of anteocular portion, second reaching to level of anterior border of eyes. Antennae inserted at or slightly before middle of anteocular portion.

Pronotum not covering mesonotum. Fore lobe subcylindrical, very slightly constricted behind middle; hind lobe short, not in every case clearly separated from fore lobe. Scutellum and metanotum lacking spines or processes. Posterior border of prosternum faintly emarginated.

Forelegs strong. Coxa and trochanter simple. Femur widened from base to beginning of ventral series, very slightly constricted beyond that point, then widened again and sub-

parallel to apex; with posteroventral and anteroventral series, as well as one stout process on outer surface slightly distad of level of beginning of series. Posteroventral series beginning at a distance from base of femur equal to one-third or one-fourth of total length of that article, composed of one basal, elongate, penicillate process followed by a large number of slender spiniform setae inserted on short, wartlike bases. Anteroventral series beginning distinctly apicad of basal process of posteroventral series, not interrupted but strongly curved at base, consisting exclusively of slender spiniform setae inserted on small, wartlike processes. Tibia short and stout, attaining about one-fourth of length of femur; ventrally with one series of short, adpressed, spiniform setae. Tarsus somewhat longer than tibia, their combined length two-thirds as long as femur. Tarsus not segmented, curved, strongly chitinized, virtually bare above and at sides, with one row of spinelike setae on ventral surface. One simple very small claw only. Mid and hind legs long but stout; hind femora considerably surpassing apex of abdomen. Femora with microchaetae and macrochaetae. First segment of mid and hind tarsi length, third about as long as first two somewhat shorter than second or third, latter subequal. Claws long and slender, simple.

Forewings not attaining apex of abdomen, narrow. Venation us usual for the tribe. Anterior and posterior basal angles of discal cell each connected to submarginal vein by a cross vein. Pterostigma attaining wing tip. Hind wings with hamus approaching Sc+R rather abruptly. M-cu cross vein very short, perpendicular to longitudinal axis of wing. R+M extended from level of cross vein to apex of wing, simple; Cu extending only slightly beyond cross vein, in some cases with an obsolete connection to central part of R+M. Pcu distinct. Transverse thickening well developed.

Abdomen elongate, parallel-sided or more or less widened posteriorly, connexival segments in some cases lobate.

Male: Seventh tergite slightly rounded behind, covering extreme base of pygophore. Eighth sternite short, not in every case visible on its entire extension, in some completely hidden. Pygophore from semisubcircular to elongate semi-oval in lateral view, its dorsal bridge very short, its posterior border with a broad, apically incised process. Parameres simple, curved. Phallus symmetrical. Articulatory apparatus short and stout. Phallosoma short, subcylindrical, membranous but with ventral sclerotization. Endosoma lacking spinelike or toothlike projections typical for most genera of the tribe, but with large and complex, well-pigmented sclerites.

Female: Genitalia strongly sclerotized. Eighth and ninth tergites subvertical, their shape and proportions varied. Gonocoxites and gonapophyses separated. Syngonapophysis large, incised apically.

TYPE SPECIES: Of *Gomesius*, *Gomesius predatorius* Distant (monobasic). Of *Algol*, *Algol hesione* Kirkaldy (monobasic). Of *Isachisme*, *Algol hesione* Kirkaldy (monobasic).

DISTRIBUTION: Oriental Region.

OBSERVATIONS: The genus was briefly described by Kirkaldy (1901) as *Algol*, a name preoccupied in the Spongiaria. In Distant's (1903e) description of *Gomesius*, the only included species, *predatorius*, was represented by a fourth- or fifth-instar nymph, as clearly shown by the original figures, a fact mentioned by Bergroth (1915). Because *Gomesius* is an available substitute for *Algol*, the new generic name *Isachisme* suggested by Kirkaldy (1904) becomes unnecessary.

KEY TO THE SPECIES OF *Gomesius*

1. General color ochraceous; region of junction of prosternum and mesosternum moderately convex in lateral view (fig. 29C, D); outline of abdomen of both sexes straight, parallel-sided, with exception of slightly flaring extreme apex (fig. 29N) . . . . . *hesione*
   General color dark brown or piceous; region of junction of mesonotum and metanotum strongly convex (figs. 30N, P; 31B); outline of abdomen not parallel-sided, more or less widened toward posterior third, in some cases connexival angles produced (figs. 30J; 31I) 2
2. Color of forelegs and forewings uniformly dark brown; eighth sternite of male not visible (fig. 30S, V) . . . . . *uniformis*
   Color of forelegs and forewings not uniform; eighth sternite of male visible (figs. 30J; 31O) 3
3. Forewings dark, with light-colored, veinlet-like reticulations on apical half (fig. 31G); antennae of male with numerous long hairs; eighth sternite of male visible on sides only,

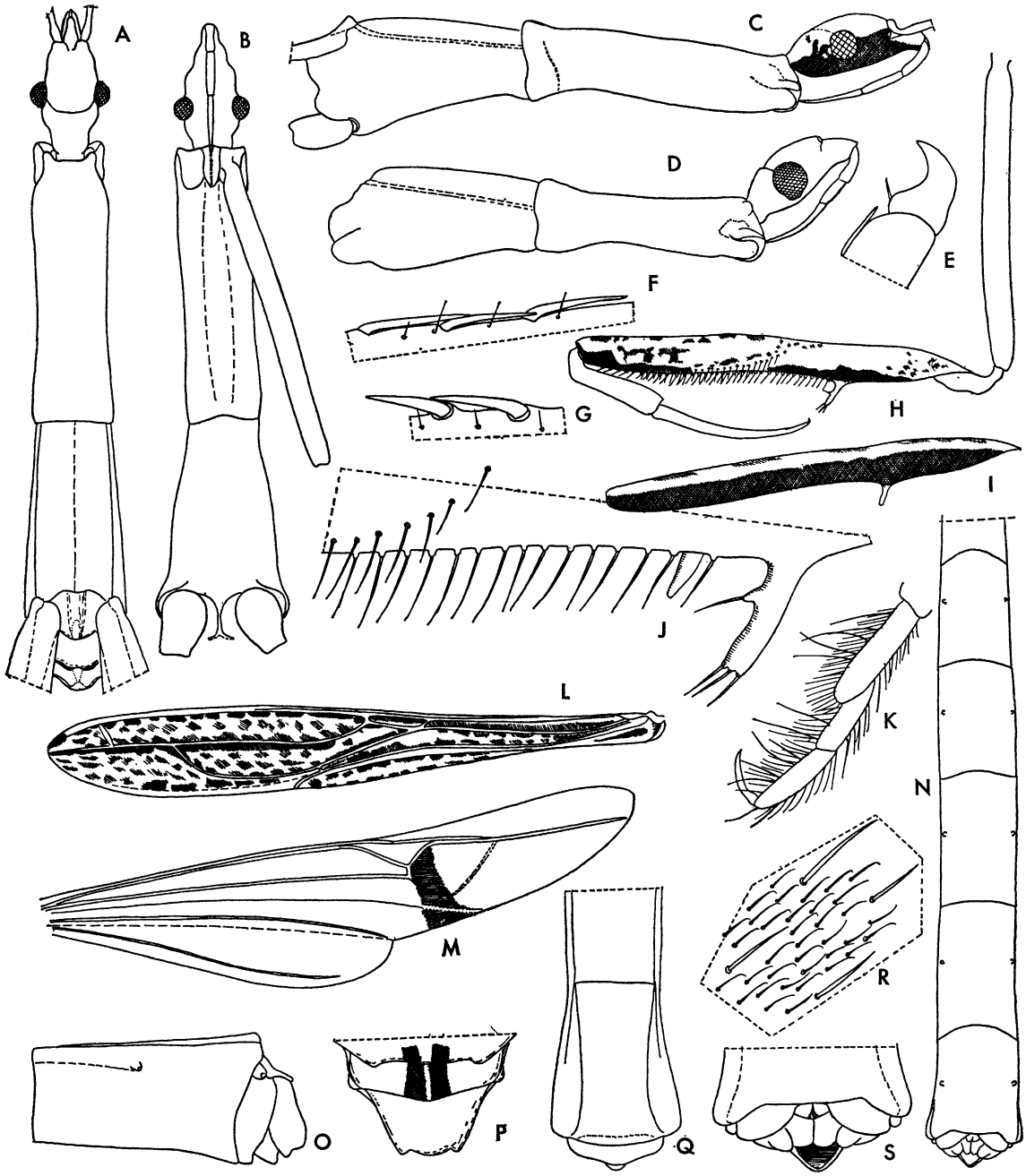


FIG. 29. *Gomesius hesione*. A. Anterior portion of body of female, dorsal view. B. Anterior portion of body of female, seen from below. C. Anterior portion of body of female, side view; color pattern shown on head only. D. Anterior portion of body of male, lateral aspect. E. Apex of fore tarsus with claw. F. Spines of under surface of fore tarsus. G. Spines of under surface of fore tibia. H. Inner surface of foreleg; color pattern shown only on femur. I. Color pattern of outer surface of fore femur. J. Armature of base of fore femur. K. Tarsus of hind leg. L. Forewing with color pattern. M. Hind wing. N. Abdomen of female, seen from below. O. Apex of abdomen of female, side view. P. Genital region of female, as seen from behind. Q. Apex of abdomen of female, dorsal aspect. R. Setae of abdominal sternite. S. Genital region of female, ventral view.

not attaining ventral surface of body (fig. 31J, O) . . . . . *bergrothi*

Forewings light-colored, with numerous small, irregular dark spots (much as shown in fig. 29L); antennae of male bare; eighth sternite of male attaining ventral surface (fig. 30J, M) . . . . . *lobatus*

Gomesius predatorius Distant could not be included in the key because it was described from a nymph.

Gomesius bergrothi, new species

Figures 6B; 31A–T

DESCRIPTION: Male and female: Length of male, 22; of female, 25 mm.

General color piceous. Head (fig. 31B) ochraceous on clypeus, also behind and in some cases above and before eyes, occasionally also shortly behind interocular suture. Rostrum dark, shiny on second and third segments; apical third of first segment, apex of second, and base of third ochraceous. First segment of antennae with six to seven very narrow, equally spaced, stramineous annuli, second with from two to four; third and fourth segments uniformly fuscous. Thorax piceous, concolorous. Coxa, femur (fig. 31F), and tibia of forelegs irregularly dotted and spotted with faint ochraceous; tarsus uniformly piceous, its base somewhat lighter. Coxae and trochantera of mid and hind legs fuscous; femora with irregularly distributed, small, ochraceous spots (fig. 31D, E), more numerous on apical half, in some cases also with a rather wide, subapical, yellowish annulus (fig. 31D). Tibiae piceous, with irregular small ochraceous spots; hind tibiae yellowish on apical half in those specimens that have subapical annuli on femora. Forewings piceous; base externally and costal margin to middle of wing luteous; veins testaceous; apical half of forewings with testaceous, veinlike reticulations (fig. 31G). Hind wings fuscous, iridescent. Abdomen piceous, irregularly mottled with ochraceous. Body surface smooth, subshining, covered with minute, almost imperceptible pile.

Head and rostrum as shown in figure 31A, B. Eyes small; interocular distance dorsally in male more than three times their width (3.3/1), in female slightly larger (3.7/1); in lateral view, eyes remote from ventral and dorsal surface of head in both sexes. Transverse ridge behind interocular furrow invariably distinct. Antennae bare in both sexes; length of first segment of male, 12.5 mm.; relative length of segments of male, 1/0.9/-0.17/0.35.

Pronotum as shown in figure 31A, B. Disc of mesonotum rather strongly elevated behind on each side (fig. 31A). Ratio of length of pronotum to length of mesonotum (without scutellum) variable: from 1.6/1 to 1.95/1 in male, from 1.2/1 to 1.85/1 in female.

Shape of forelegs as shown in figure 31C; general structure as illustrated for *G. hesione* (see fig. 29E–J); unspined portion of femur one-fourth of total length of segment (fig. 31F). Mid and hind legs as given in generic description; hind femora surpassing apex of abdomen by 7 to 11 mm.

Forewings falling 2 to 3 mm. short of apex of abdomen; their venation as shown in figure 31G. Length of discal cell from three to three and one-half times the length of apical free portion of M. Rs cross vein either distinct or not.

Third through sixth abdominal sternites with 1+1 small, sublateral protuberances; hind angle of fifth through seventh connexival segments slightly projecting.

MALE: Abdomen slender, but distinctly widened toward posterior third. Genital region as shown in figure 31J, L, O. Eighth sternite exposed on sides only, ventral portion not visible. Posterior border of pygophore subvertical, posterior process long and slender, its points small, strongly sclerotized, polished (fig. 31K). Parameres as shown in figure 31S; phallus as shown in figure 31P–R, T.

Female: Abdomen wider than that of male, widened toward posterior third. Genital region as shown in figure 31H, I, M, N. Seventh tergite rounded behind, eighth subtriangular, ninth subtrapezoidal, posterior angles slightly elevated, its center posteriorly with a small median projection.

MATERIAL EXAMINED: *Sumatra*: East coast (P. J. v. d. Berch; Rijksmuseum van natuurlijke Histoire), one male holotype; Sumatra (Naturhistorisches Museum, Vienna), one male paratype. *Borneo*: Brunei [Capt. Waterstradt, Van der Poll; British Museum (Natural History)], one female allotype. *Malaya*: Kuala Lumpur, Ampang,

March 3, 1935 (H. M. Pendlebury; the American Museum of Natural History), one female paratype. *Mentawei*: Sipora, October 10, 1924 [H. H. Karny; British Museum (Natural History)], one female paratype.

OBSERVATIONS: There is some variation in the relative lengths of the pronotum and mesonotum and in the coloring of the mid and hind legs. However, all specimens agree perfectly in the all-important genital characters, a fact that makes their conspecificity virtually certain.

This new species, dedicated to the memory of the great hemipterist Ewald Bergroth, differs from its congeners by the combination of characters given in the key.

Gomesius hesione (Kirkaldy)

Figures 9A, B, D; 29A–S; 30A–I

Algol hesione KIRKALDY, 1901, p. 54.
Gomesius hesione: BERGROTH, 1906a, p. 321.
Gomesius insaturabilis BERGROTH, 1915, p. 111 (new synonymy).

This is the type species of *Algol*. The color has been well described by Bergroth (1915), and the figures given here illustrate the main morphological features of the species. In addition to the characters mentioned in the key, the following are important: ratio of length of pronotum to length of mesonotum variable: from 1.15/1 to 1.55/1 in male, from 1.5/1 to 1.8/1 in female; cell of forewing from 2.05 to 3.0 times the length of apical free portion of M; eighth sternite of male completely exposed (fig. 30B), pygophore elongate, its posterior border subhorizontal; posterior process of medium length, its points acute (fig. 30E).

The two specimens on which Bergroth (1915) based his *insaturabilis* now have been examined. Both are males. Bergroth (*loc. cit.*) distinguished his species from *hesione* mainly by the relatively shorter pronotum and the shorter unarmed basal portion of the fore femur. As is shown above, the proportions of the thoracic segments are highly variable, and the pronotum tends to be relatively shorter in the male than in the female. The length of the unarmed portion of the fore femur has now been found to be constantly about one-third of the total length of the article. This difference is true in Bergroth's specimens as well as in others, including material topotypical with Kirkaldy's insects. These considerations have motivated the above synonymy.

MATERIAL EXAMINED: *Formosa:* Kosempo, September, 1912 (H. Sauter; the American Museum of Natural History), one male. *Philippines:* Los Baños (Baker; Museum Zoologicum Universitatis), one male (obviously one of Bergroth's specimens). *Malaya:* Kuala Lumpur, July 20, 1928, at light [N. C. E. Miller; British Museum (Natural History)], one male. *Borneo:* Sarawak, 1907–1909 [C. J. Brooks; British Museum (Natural History)], one male. *Java:* Samarang, November, 1909 (E. Jacobson; Museum Zoologicum Universitatis), one male (obviously another of Bergroth's specimens); Samarang, November, 1909 (E. Jacobson; Rijksmuseum van natuurlijke Historie), one male. *Sumatra:* Padangsam Bovenlani (Rijksmuseum van natuurlijke Historie), one female. *New Guinea:* Hollandia-Binnen, October 16, 1957, 25 meters (J. L. Gressitt; Bernice P. Bishop Museum), one male; Waris, south of Hollandia, August 1–7, 1959, 450 to 500 meters (T. C. Maa; Bernice P. Bishop Museum), one male; northeast Papua, Mt. Lamington, 1300 to 1500 feet (C. T. McNamara; South Australian Museum), two males.

DISTRIBUTION: Formosa; Malaya; Philippines; Sumatra; Borneo; Java; New Guinea.

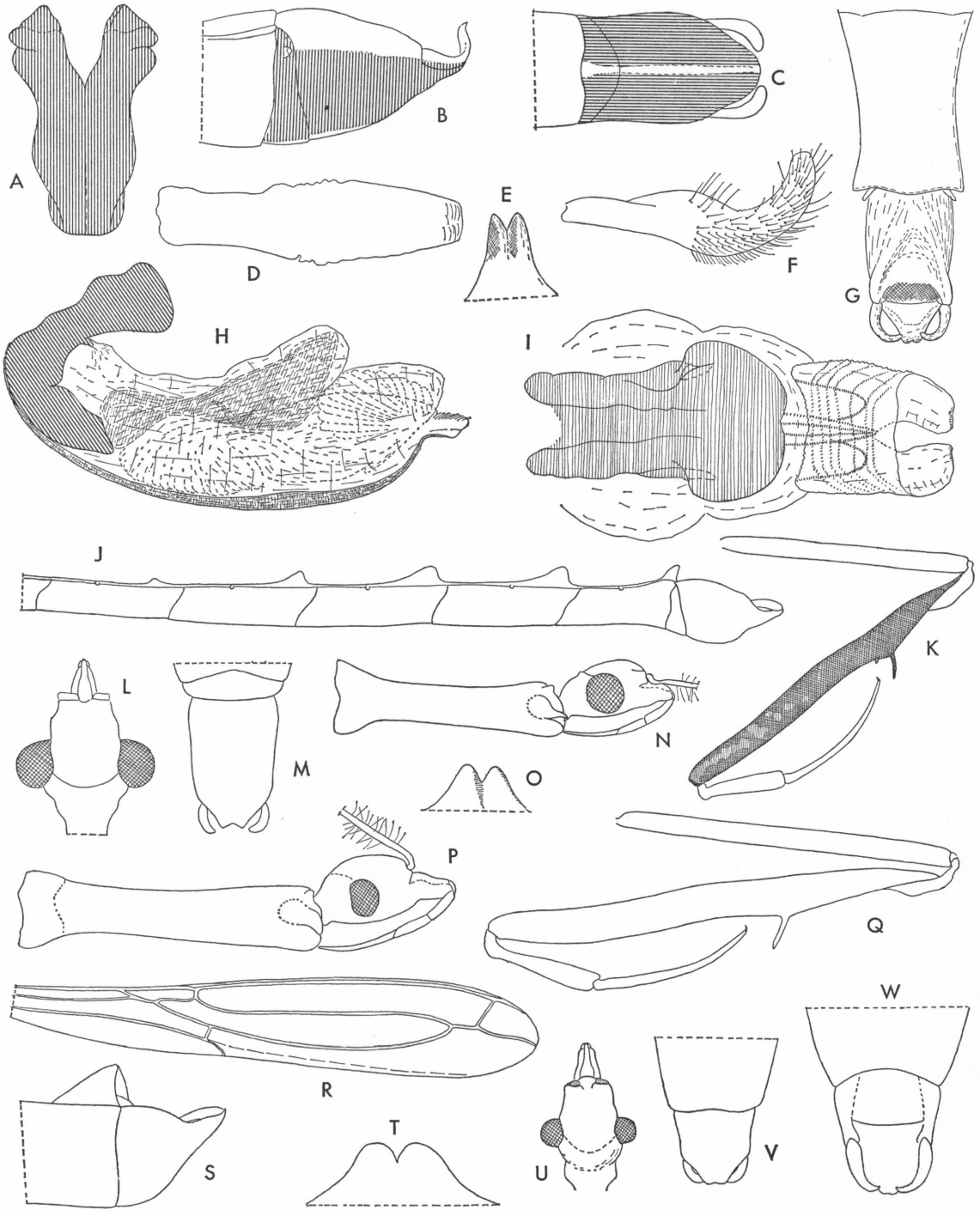
TYPES: Of *hesione*, female, Rijksmuseum van natuurlijke Historie; of *insaturabilis*, male, Museum Zoologicum Universitatis.

Gomesius lobatus, new species

Figure 30J–O

DESCRIPTION: Male: Length, 22.2 mm.

General color piceous; head somewhat lighter on clypeus and at base of neck. Rostrum with first and second segments narrowly at apex, third with base and apex rather broadly, ochraceous. First and second segments of antennae irregularly mottled with luteous. Thorax uniformly dark; lateral carina of mesonotum stramineous. Forelegs dark, femur on apical half faintly mottled with ochraceous on external surface (fig. 30K), tibia with one large yellow spot subbasally and one subapically; hairs on apical half of tibia pale golden yellow. Coxa, trochanter, base and apex of femur of mid leg


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W

mottled with luteous; tibia dark at extreme base and on apex only, the rest stramineous. Hind legs not preserved. Forewings stramineous, with faint brown spots much as in *hesione*, subcostal margin narrowly piceous from middle on; whole surface of wing with minute blackish spots and stripes, visible with high magnification only. Abdomen piceous, faintly mottled with fuscous. Body surface smooth, subshining, with rather distinct white pile.

Head and rostrum as shown in figure 30L, N. Eyes large, salient, dorsal interocular distance equal to twice their width; in lateral view, eyes approaching level of lower surface of head. First and second segments of antennae with numerous long hairs, their length equal to not more than twice the diameter of segment. Length of first segment, 10 mm.; relative length of segments, 1/0.65/0.27/-0.35.

Pronotum as shown in figure 30N; 1.4 times as long as mesonotum. Mesonotum only moderately elevated on disc, lateral elevations not conspicuous.

Shape of forelegs as shown in figure 30K; femur slender, its unspined portion occupying slightly more than one-fourth of total length of segment.

Forewings falling 2.5 mm. short of apex of abdomen; discal cell twice the length of apical free portion of M; Rs cross vein faint.

Abdomen slender, only slightly widened on posterior third; connexival angles of third through seventh segments strongly salient (fig. 30J). Genital segments as shown in figure 30J, M, O; eighth sternite completely exposed; pygophore elongate, its posterior border subhorizontal; posterior process very short (fig. 30M, O).

MATERIAL EXAMINED: West New Guinea: Humboldt Bay district, "Wembl.," August 2, 1937 [British Museum (Natural History)], one male holotype.

OBSERVATIONS: This species is distinguishable from the others by the characters given in the key and the conspicuously lobate connexival segments.

Gomesius predatorius Distant

Gomesius predatorius DISTANT, 1903e, p. 212, fig. 150.

This is a nymph which cannot be placed exactly. Its general color is fuscous, and it is characterized by the presence of 1+1 spine-like processes on the dorsal surface of the abdomen; this might be a nymphal character.

DISTRIBUTION: Ceylon.

TYPE: Nymph, British Museum (Natural History).

Gomesius uniformis, new species

Figure 30P–W

DESCRIPTION: Male: Length, 24.2 mm.

General color piceous. Head ochraceous on clypeus and behind eyes. Rostrum shiny, apex of second segment ochraceous. Antennae fuscous, base of first segment with a rather broad annulus and apex with a very narrow ochraceous one. Thorax piceous, processes of collar ochraceous, sides and dorsal surface of pronotum irregularly and faintly mottled with testaceous; carina of mesonotum stramineous. Mesothorax and metathorax uniformly piceous. Forelegs uniformly castaneous. Mid and hind coxae piceous, their apical fourth stramineous; trochantera and extreme base of femora stramineous; rest of femora rather light castaneous, apically with a stramineous annulus, twice as wide on hind as on mid femora; tibiae testaceous, their extreme base stramineous. Forewings uniformly castaneous. Abdomen piceous, rather extensively mottled with testaceous, the basal third of each connexival segment luteous. Body surface smooth, subshining, minute whitish pile on ventral surface of thorax and abdomen.

FIG. 30 (OPPOSITE PAGE). A–I. *Gomesius hesione*, male. A. Articulatory apparatus. B. Apex of abdomen, lateral aspect. C. Apex of abdomen, ventral view. D. Ventral sclerotization of phallosoma. E. Posterior projection of pygophore. F. Paramere. G. Apex of abdomen, dorsal aspect. H. Phallus, lateral view. I. Phallus, seen from above. J–O. *Gomesius lobatus*, male. J. Abdomen, lateral aspect. K. Foreleg; color pattern shown on femur only. L. Head, from above. M. Genital region, ventral aspect. N. Head and thorax, lateral view. O. Apex of projection of pygophore. P–W. *Gomesius uniformis*, male. P. Head and prothorax, lateral view. Q. Foreleg. R. Forewing. S. Genital region, lateral aspect. T. Projection of pygophore. U. Head, seen from above. V. Genital region, seen from below. W. Apex of abdomen, dorsal aspect.

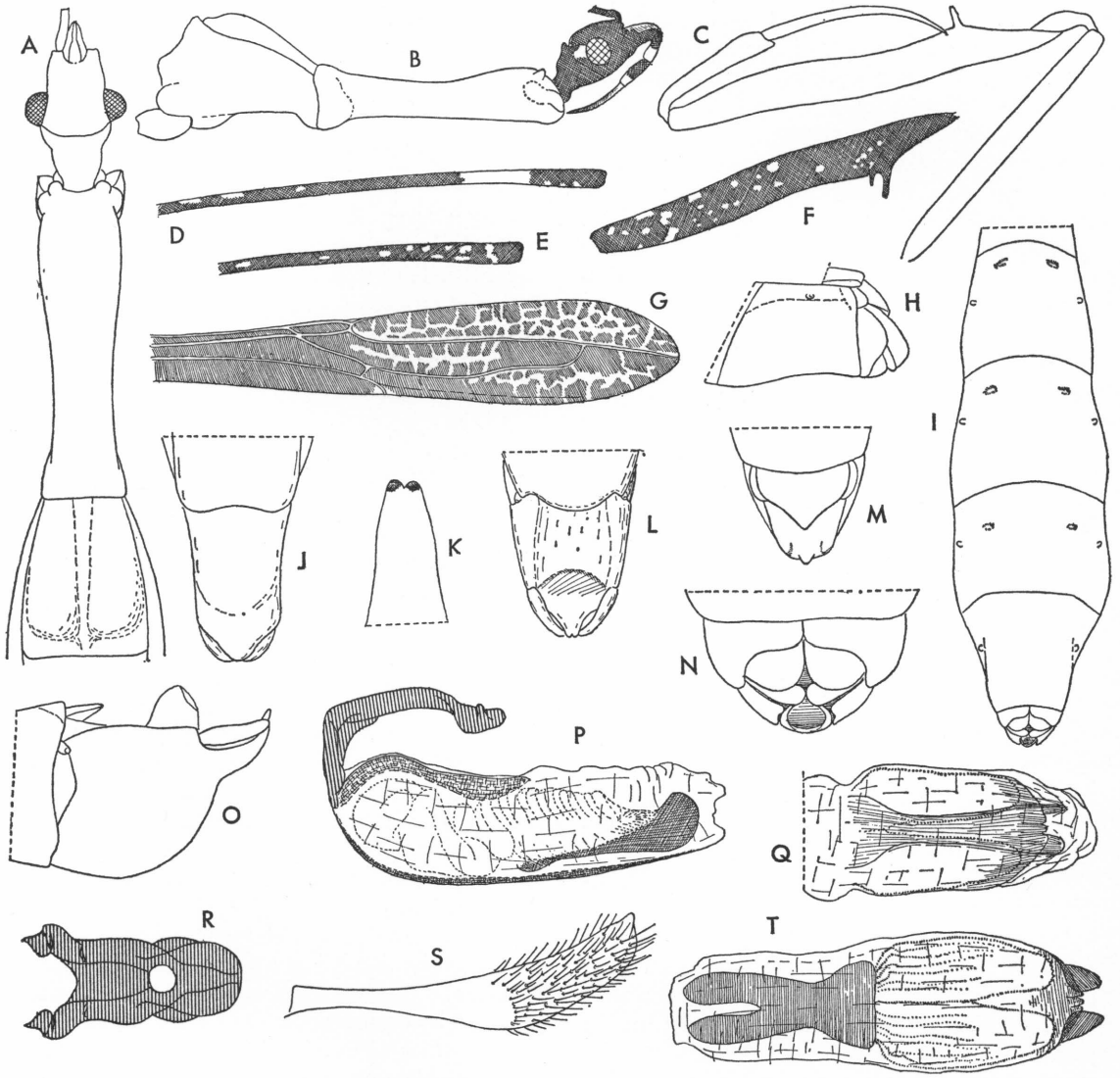


FIG. 31. *Gomesius bergrothi*. A. Head and thorax of male, dorsal view. B. Head and thorax of male lateral aspect. C. Foreleg. D, E. Color pattern of apex of mid femora of different specimens. F. Color pattern of fore femur. G. Forewing with color pattern. H. Apex of abdomen of female, lateral view. I. Abdomen of female, seen from below. J. Genital region of male, ventral aspect. K. Posterior projection of pygophore. L. Genital region of male, as seen from above. M. Genital region of female, seen from behind. N. Genital region of female, ventral view. O. Genital region of male, lateral aspect. P. Phallus, side view. Q. Phallosoma, ventral view. R. Articulatory apparatus. S. Paramere. T. Phallosoma, dorsal aspect.

Head and rostrum as shown in figure 30P, U. Eyes small, interocular distance slightly more than twice their width; in lateral view, eyes not attaining level of ventral surface of head. First and second segments of antennae with numerous long hairs which attain about three times length of diameter of segment. Length of first segment, 14.5 mm.; relative length of segments, 1/0.75/0.17/0.45.

Pronotum slender, 1.6 times as long as mesonotum, the latter moderately elevated.

Forelegs as shown in figure 30Q; unspined section of femur about one-fourth of total length of article. Hind femora surpassing apex of abdomen by 11 mm.

Forewings falling short of apex of abdomen by about 2.5 mm.; their venation as illustrated in figure 30R; discal cell about three

times as long as apical free section of M. Rs cross vein distinct.

Abdomen slender, slightly but distinctly widened toward posterior third; connexival margins entire. Genital region as shown in figure 30S, T, V, W; eighth sternite completely hidden. Process of pygophore very short and wide (fig. 30T).

MATERIAL EXAMINED: Sumatra: West Sumatra: Siberut Island, September, 1924 [C. B. K. and N. S.; British Museum (Natural History)], one male holotype.

OBSERVATIONS: The most important diagnostic features of *uniformis* are mentioned in the key.

GUITHERA DISTANT

Guithera DISTANT, 1906, p. 364.
Lutevula BREDDIN, 1909, p. 303.

DESCRIPTION: Macropterous. Small species (5–8 mm.).

Color rather uniformly ochraceous, or piceous with luteous pattern elements. Body surface shining, in some cases minutely and sparsely tuberculate; long hairs absent from body surface.

Head fusiform, anteocular portion conspicuously narrowed, longer than postocular, postocular subsemiglobular, slightly truncate behind in dorsal view, distinctly separated from short neck. Interocular furrow originating at level of posterior border of eyes, curved backward to far behind said level, not forming an incision, thus outline of dorsal surface of head continuous in lateral view. Rostrum straight, slender, not bent between first and second segments, both of subequal length, first reaching to center of anteocular region, second to about level of center of eyes, third one and a half times as long as either first or second. Antennae inserted near anterior border of eyes.

Pronotum complete, covering mesonotum with exception of a small region before scutellum. Fore lobe approximately as long as wide, widest at center, convex, with a delicate, median, longitudinal impression. Hind lobe as long as, or slightly longer than, fore lobe, separated from the latter by a constriction; hind lobe wider than long, its sides conspicuously diverging posteriorly, its disc anteriorly with 1+1 nodules laterally. Scutellum and metanotum lacking projections or spines. Posterior border of prosternum rounded.

Forelegs stout. Coxa and trochantera simple. Femora ventrally with posteroventral and anteroventral series composed of short and long spines inserted on small, wartlike bases, and an accessory series consisting of a single row of small, peglike spines. Posteroventral series beginning at base of article, fourth or fifth spine from base longest, remainder medium-sized to short. Anteroventral series beginning beyond basal third of article, not interrupted at base, the first spine much longer than the others, the remainder, medium-sized to short. Accessory series beginning at about level of base of anteroventral series. Fore tibia not more than one-half of length of femur, ventrally with a single series of short deflexed spines found only on part of whole length of article. Fore tarsus slightly shorter or longer than tibia, curved, not segmented or two-segmented, with second segment very short, strongly sclerotized, bare with exception of a group of setae at base ventrally. A single, well-developed, simple claw present. Mid and hind legs slender, hind femora surpassing apex of body, femora with simple short setae of uniform type. Mid and hind tarsi with first segment slightly shorter than second, third longest, setae simple. Claws slender, curved, simple.

Forewings rather wide apically; discal cell as usual for tribe, its base connected to submarginal vein by r-m cross vein, frequently M+Cu connected to costal margin by a cross vein somewhat basad of discal cell. Rs situated very near apex of wing. Pterostigma carried to wing tip. Hind wing (examined in only one of three subgenera) with hamus approaching Sc+R at a moderate angle, fused to Sc+R on basal two-thirds. M-cu cross vein obliquely inclined toward wing base; section of M connecting m-cu to R+M very short, perpendicular to longitudinal axis of wing. R+M simple, extending from level of cross vein to wing tip. Cu extending from cross vein to apical portion of hind border of wing, somewhat evanescent apically, connected at level of its center to center of R+M by an oblique cross vein, thus forming a large cell. 1A elongate, joining Cu at point of emission of Cu-r+m cross vein. Transverse thickening absent.

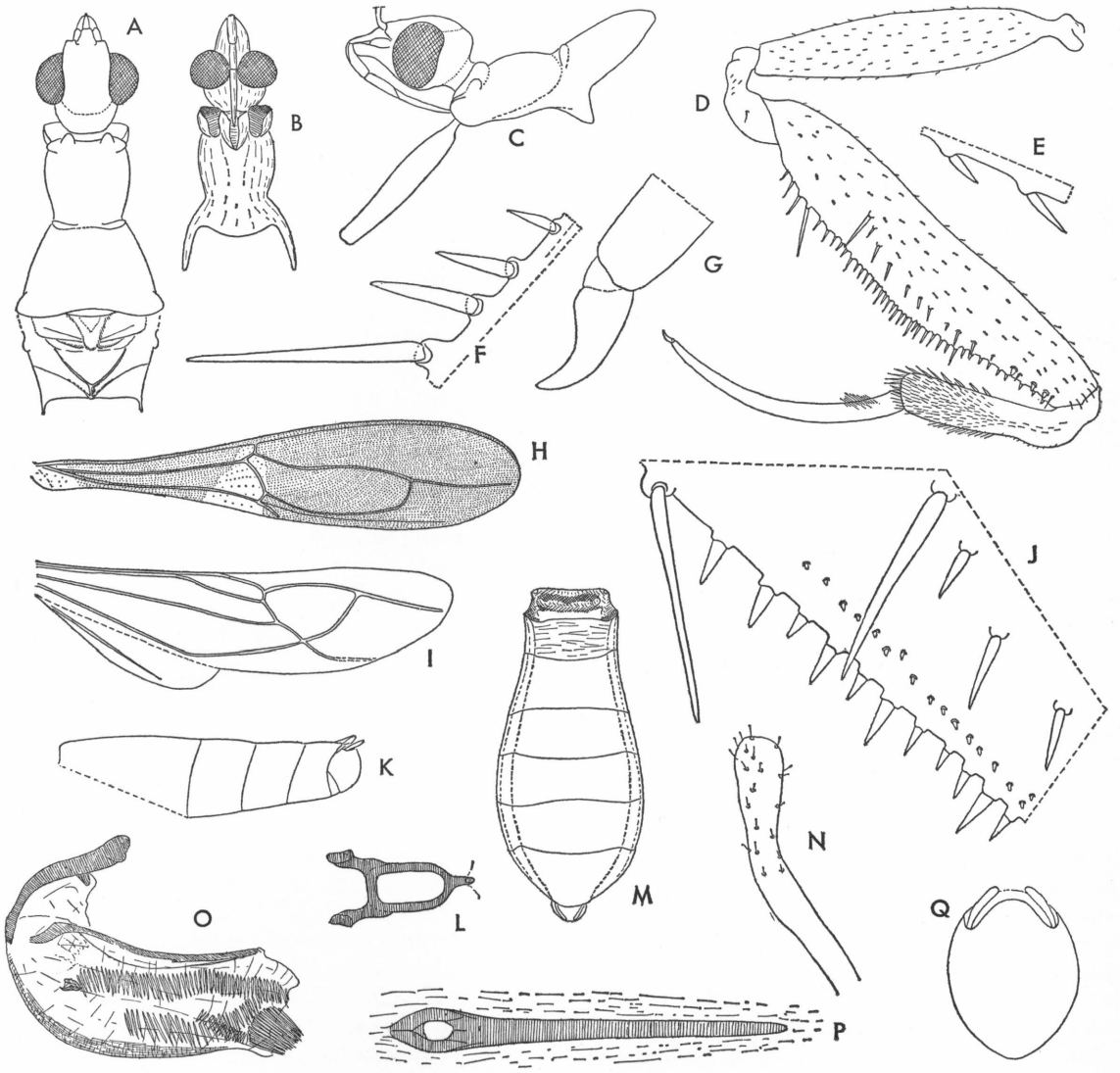


FIG. 32. *Guithera feana*, male. A Head and thorax, seen from above. B. Head and prothorax, ventral view. C. Head and prothorax, side view. D. Foreleg. E. Spines of ventral surface of fore tibia. F. Basal spines of posteroventral series of fore femur. G. Apex of fore tarsus with claw. H. Forewing, with color pattern. I. Hind wing. J. Detail of proximal half of fore femur. K. Abdomen, lateral aspect. L. Articulatory apparatus. M. Abdomen, dorsal aspect. N. Paramere. O. Phallus, side view. P. Fused struts of phallus. Q. Pygophore, posterior view.

Abdomen compressed dorsoventrally, broadly united to thorax. Sternites with a single type of setae only.

Male: Pygophore transverse in dorsal view, its superoposterior border broadly salient in middle. Parameres short, curved, with short unspecialized setae. Basal plates shorter than phallosoma, distinctly separated, connected near their base by a transverse bridge. Phallosoma membranous, sclerotized dorsally and ventrally, in some cases dorsal and ventral sclerotized regions connected by a lateral sclerotized area. Endosoma with a transverse sclerotized plate, 1+1 lateral and 1+1 subapical groups of spinelike projections, apical ones each forming a tuftlike group in uneverted or partially everted endosoma. Struts separated only beyond base, united for most

of their length, forming a very slender, rod-like sclerite.

Female: Genital region (a single species examined) simple; eighth tergite subsemicircular, its outlines a continuation of connexival margin; ninth subhorizontal, subtrapezoidal. Gonocoxites large, widely exposed. Gonocoxites and gonapophyses separated. Syngonapophysis not conspicuous when *in situ*.

TYPE SPECIES: Of *Luteva*, *Luteva feana* Distant (original designation). Of *Lutevula: Guithera hortensia* Distant (as *Lutevula lutea* Breddin) (monobasic).

DISTRIBUTION: Oriental Region.

OBSERVATIONS: The species included in the genus, as it is understood in the present paper, belong apparently to three different evolutionary lines. The available material is scarce, and it has not been possible to examine both sexes in all the lines considered. At this time, their relationships are expressed by according them subgeneric status, as follows:

GUITHERA (GUITHERA)

Size 5 mm. or less; conspicuously bicolorous; fore tarsi longer than tibiae, not segmented; Rs and cross vein connecting M+Cu to costal margin basad of discal cell absent.

GUITHERA (LUTEVULA)

Size about 8 mm.; color rather uniformly ochraceous, markings not conspicuous; fore tarsi shorter than tibiae, not segmented; Rs and cross vein connecting M+Cu to costal margin basad of discal cell present.

GUITHERA (PROGUITHERA)

Size about 8 mm.; color rather uniformly ochraceous, markings not conspicuous; fore tarsi shorter than tibiae, two-segmented, apical segment short; Rs and cross vein connecting M+Cu to costal margin basad of discal cell present.

Closely related to the Ethiopian *Bagaudella*, the genus *Guithera* seems to represent the apomorphic group, as shown by its specialized characters: tarsi one- or two-segmented (three-segmented in *Bagaudella*), hind lobe of pronotum with transverse nodules (absent from *Bagaudella*), a strongly shortened pygophore, and a reduced number of spines on the ventral surface of the fore femur.

Guithera nubifera Distant (1906), though superficially similar to *Guithera* (*Lutevula*) and *Guithera* (*Proguithera*), does not belong in *Guithera* nor even in the Leistarchini. It was made the type of the genus *Stenorhamphus* by Elkins (1962) and is here included in the plesiomorphic tribe Collartidini.

KEY TO THE SUBGENERA AND SPECIES OF *Guithera*

1. Fore tarsi two-segmented, apical segment very short (fig. 34B, C) . . . . . *Guithera* (*Proguithera*) *drescheri*
   Fore tarsi one-segmented (figs. 32D; 33B) . 2
2. Size about 8 mm., color rather uniformly ochraceous, pattern elements not conspicuous; fore tarsus shorter than tibia (fig. 33B); Rs and cross vein connecting M+Cu to costal margin basad of discal cell present (fig. 33A) . . *Guithera* (*Lutevula*) *hortensia*
   Size 5 mm. or less; conspicuously bicolorous; fore tarsus longer than tibia (fig. 32D); Rs and cross vein mentioned absent (fig. 32H) . . . . . *Guithera* (*Guithera*) *feana*

GUITHERA (GUITHERA) DISTANT

Guithera DISTANT, 1906, p. 364.

TYPE SPECIES OF *Guithera* (*Guithera*): *Luteva feana* Distant (original designation).

Guithera (Guithera) feana (Distant)

Figure 32A–Q

Luteva feana DISTANT, 1903a, p. 1.
Guithera feana: DISTANT, 1906, p. 364.

An illustration of the general aspect of the species has been given by Distant (1903e). Many morphological details are shown in the figures given in the present paper. The phallosoma is largely membranous.

No morphological differences could be found between the specimens presently examined, one from South India and the other from Thailand, but the Indian specimen lacks the clear-colored spot on the apex of the forewing that is to be found in the Thailand individual.

MATERIAL EXAMINED: *Thailand*: Bangkok [H. Hillman; British Museum (Natural History)], one male (compared by R. L. Usinger with type). *India:* South India: Karikal Territory: Kurumbagaram, July, 1952 (P. S. Nathan; the American Museum of Natural History), one male.

DISTRIBUTION: India; Burma; Thailand.

TYPE: British Museum (Natural History).

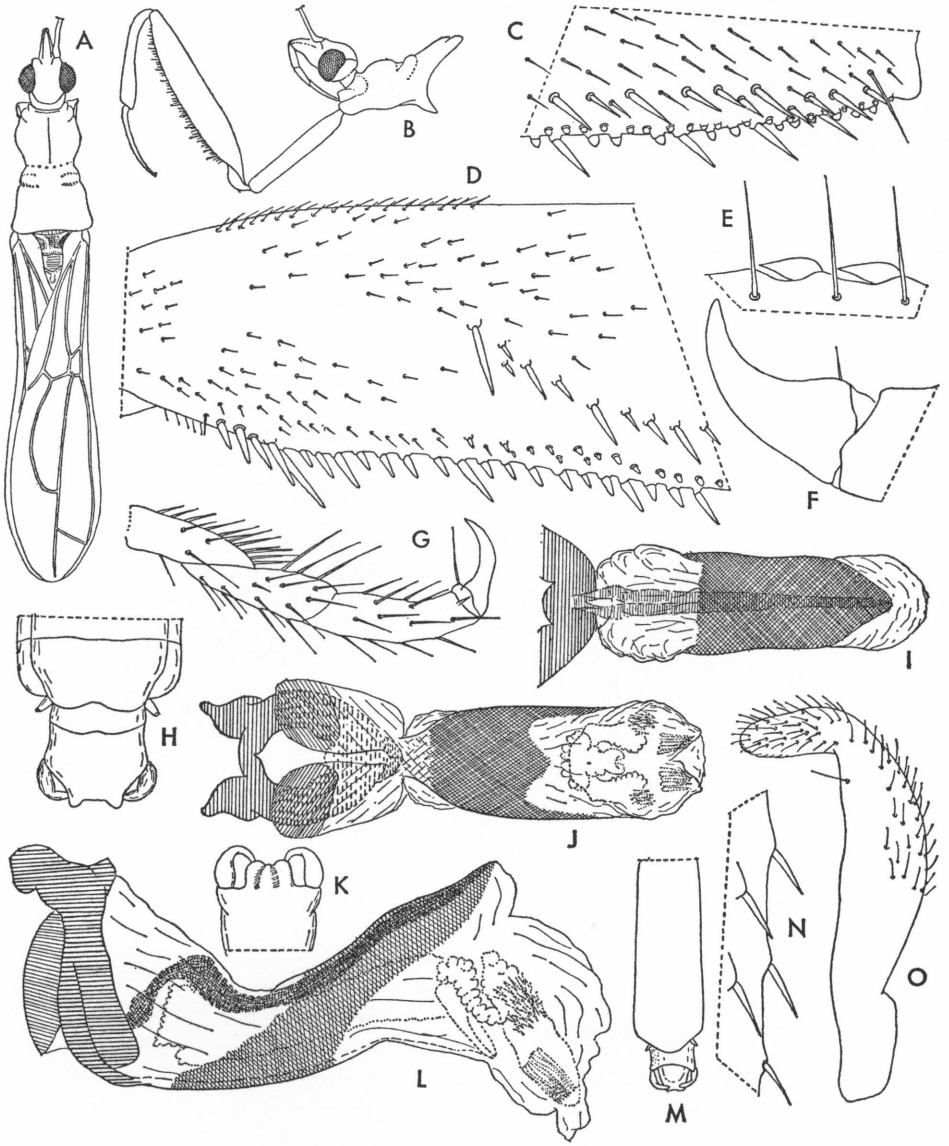


FIG. 33. *Guithera hortensia*, male (type specimen of *Lutevula lutea*). A. General aspect. B. Anterior portion of body, side view. C. Detail of ventral portion of apex of fore femur. D. Base of fore femur. E. Detail of under surface of fore tibia. F. Apex of fore tarsus with claw. G. Posterior tarsus. H. Apex of abdomen, ventral aspect. I. Phallosoma, dorsal view. J. Phallus, ventral view. K. Pygophore, seen from behind. L. Phallus, lateral aspect. M. Apical half of abdomen, seen from above. N. Setae of posterior femur. O. Paramere.

GUITHERA (LUTEVULA) BREDDIN

Lutevula BREDDIN, 1909, p. 303.

TYPE SPECIES OF *Guithera* (*Lutevula*): *Guithera hortensia* Distant (as *Lutevula lutea* Breddin) (monobasic).

Guithera (Lutevula) hortensia Distant

Figure 33A–O

Guithera hortensia DISTANT, 1906, p. 364.

Lutevula lutea BREDDIN, 1909, p. 303, figs. 26, 27.

I accept the above synonymy established tentatively by Distant (1910).

A male specimen obtained from the Deutsches Entomologisches Institut, where Breddin's material is preserved, agrees perfectly with that author's description of *Lutevula lutea*, and, though devoid of any label, is accepted as being the type of this species. Its main features are illustrated here. The phallus is characterized by the very extensive sclerotization of the phallotheca. Another difference as compared with *feana* is the considerable reduction in the number of spinelike projections of the endosoma, especially in the sublateral group.

DISTRIBUTION: Ceylon.

TYPE Of *hortensia*, British Museum (Natural History); of *lutea*, Deutsches Entomologisches Institut.

GUITHERA (PROGUITHERA), NEW SUBGENUS

The new subgenus is defined by the two-segmented fore tarsus, shorter than the respective tibia, and the presence of a cross

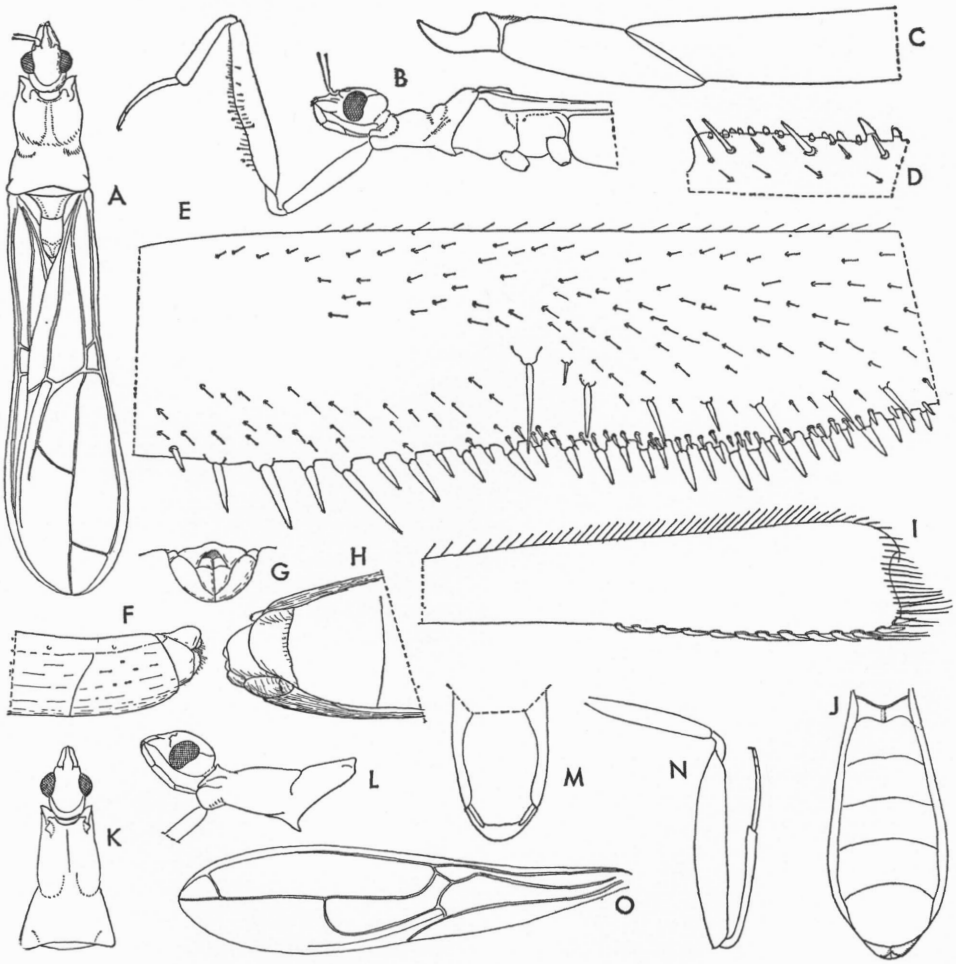


FIG. 34. A–J. *Guithera drescheri*, female. A. General aspect. B. Anterior portion of body with foreleg, lateral view. C. Apical portion of fore tarsus with claw. D. Detail of under surface of apex of fore femur. E. Basal half of fore femur. F. Apex of abdomen, lateral view. G. Genital region, seen from behind. H. Apical portion of abdomen, dorsolateral view. I. Apical half of fore tibia. J. Abdomen, seen from below. K–O. *Bagaudella whitfieldi*, male. K. Head and pronotum, dorsal view. L. Head and prothorax, lateral aspect. M. Pygophore, seen from above. N. Foreleg. O. Forewing. (K–O adapted from Miller, 1952.)

vein connecting M+Cu to the costal margin basad of the discal cell in the forewing.

TYPE SPECIES OF *Guithera (Proguithera)*: *Guithera (Proguithera) drescheri*, new species.

ETYMOLOGY: *Pro-*, before; and *Guithera*, a genus of the Emesinae.

Guithera (Proguithera) drescheri, new species

Figure 34A–J

DESCRIPTION: Female: Length to apex of forewings, 9 mm.

General body color ochraceous. Dorsal surface of head posteriorly and posterior portion of hind lobe of pronotum somewhat darkened, almost castaneous; forewings fulvous, veins ochraceous, a creamy white spot basad of discal cell in region between Cu and Pcu+1A and inner margin of wing. Abdomen of general body color, very slightly darkened at apex below; connexival margin faintly reddish. First segment of antennae fuscous. Forelegs ochraceous, femora faintly darkened apically. Coxae, trochantera, and base of femora of mid and hind legs ochraceous, the rest fuscous. Surface of body subshining, rostrum and forelegs polished. Pilosity short, inconspicuous, that on head and fore lobe of pronotum inserted on numerous tiny granules.

Head and rostrum as shown in figure 34A, B. Distance between eyes dorsally slightly more than twice their width, eyes kidney-shaped in lateral view and not attaining level of dorsal and ventral surface of head. Length of first segment of antennae, 4.5 mm.

Thorax as given in generic description and shown in figure 34A, B. Fore lobe rather deeply sulcate along middle dorsally, distinctly convex on each side of median sulcus. Hind lobe much wider across humeri than its length along middle, deeply emarginated behind. Fore lobe smooth, hind lobe irregularly rugose, both with very numerous, tiny, setiferous granules.

Forelegs as given in generic and subgeneric description and shown in figure 34B–E, I. Femur eight times as long as maximum width. Posteroventral series composed of approximately 45 spines, two near base slightly but distinctly longer than any of the others, the spines becoming extremely short apically (fig. 34D). Anteroventral series composed of not more than 20 short and widely spaced spines, the basal one more slender and distinctly longer than any of the others (fig. 34E). Fore tibia stout, slightly shorter than half of length of femur, the apical half of its ventral surface with one row of deflexed spines (fig. 34I). Fore tarsus about as long as tibia, its apical segment slightly more than one-tenth as long as first. Shape of claws as shown in figure 34C. Mid and hind legs rather stout; chaetotaxy of femora and structure of tarsi and claws like those in *Guithera (Lutevula) hortensia* (see fig. 33G, N). Hind femora surpassing apex of forewings by 1.5 mm.

Forewings surpassing apex of abdomen by 1.5 mm.; their shape and venation as shown in figure 34A, characterized by a peculiar thickening of Cu along base of discal cell. Surface of forewing minutely reticulate, region basad of discal cell irregularly rugose transversely. Hind wings not examined.

Abdomen compressed dorsoventrally, its surface microscopically rugose transversely. Genital region as given in generic description and shown in figure 34F–H, J.

MATERIAL EXAMINED: Java: Dreangar, Tangkoeban Prahoe, March, 1937, 4000 to 5000 feet (F. C. Drescher; Rijksmuseum van Natuurlijke Historie), one female holotype.

LEISTARCHES DOHRN

Leistarches DOHRN, 1860, p. 240.

Ploiaria (Megaploiaria) MCATEE AND MALLOCH, 1926, p. 139.

Megaploiaria: WYGODZINSKY, 1948a, p. 232.

DESCRIPTION: Macropterous. Medium-sized species (13–19 mm.).

Body surface dull to slightly shining; pubescence short and inconspicuous. General color brown, with conspicuous white pattern elements on body and appendages.

Head fusiform, pointed anteriorly, shortly rounded posteriorly; anteocular longer than postocular portion. Interocular furrow originating at level of middle of eyes, strongly bent backward, approaching level of posterior border of eyes. Eyes medium-sized. Rostrum slender, straight or slightly bent between first and second segments. First segment slightly surpassing middle of anteocular portion; second as long as first, almost reaching level of posterior border of eyes; third longer or shorter than first two. Antennae inserted

somewhat before middle of anteocular portion.

Pronotum not covering mesonotum. Fore lobe from subglobular to elongate-subcylindrical; hind lobe very short. Mesonotum subrectangular, sulcate along middle dorsally. Scutellum and metanotum lacking spines or processes. Posterior border of prosternum rounded.

Forelegs stout. Coxa simple. Trochanter ventrally with several slender, spinelike setae. Femur ventrally with two series of short, slender, spinelike setae, each series composed of several irregularly arranged compact rows. Posteroventral series beginning at base of article; anteroventral series beginning somewhat distad of other series, not interrupted at base. Fore tibia somewhat more than half as long as femur, ventrally with one series of short deflexed spines. Tarsus half as long as tibia, glossy, virtually bare above and at sides, ventrally with one series of short, slender, adpressed spines. Tarsus three-segmented; basal segment almost twice as long as second and third combined, the third slightly shorter than second. Two simple claws, one distinctly larger than the other. Posterior femur distinctly surpassing apex of abdomen. Tarsus of mid and hind legs with first and third segments subequal in size, second slightly shorter; setae short, simple; claws simple, stout.

Venation of forewings as usual for the tribe; anterior and posterior basal angle of discal cell each connected to submarginal vein by a cross vein. Apex of pterostigma approaching wing tip. Surface of forewings smooth. Hind wings with hamus approaching Sc+R only gradually, then parallel to it for its entire length. M-cu cross vein perpendicular to longitudinal axis of wing, slightly curved. R+M extended from level of cross vein to wing border; Cu extending only a short distance beyond cross vein; both simple, not connected. Transverse thickening well developed.

Abdomen moderately slender, broad at base, widest before middle. Connexival margins entire, forming a continuous outline.

Male: Pygophore about as long as high in lateral view; dorsal sclerotization occupying its anterior two-thirds; posterosuperior margin of pygophore with a process of varied shape. Parameres slender, apically curved, their setae simple. Phallus typical for the tribe; basal plates short; struts well developed; phallotheca membranous, dorsal and ventral sclerotizations present, bandlike; endosoma with several series of spinelike projections of various sizes.

Female: Eighth and ninth tergites well developed, subhorizontal, ninth larger than eighth. Gonocoxites and gonapophyses completely exposed, separated. Syngonapophysis salient, elongate, with a deep apical incision.

TYPE SPECIES: Of *Leistarches*, *Leistarches serripes* Dohrn (monobasic). Of *Ploiaria* (*Megaploiaria*), *Ploiaria* (*Megaploiaria*) *fusca* McAtee and Malloch (monobasic).

DISTRIBUTION: Australian and Oriental regions.

KEY TO THE SPECIES OF *Leistarches*

Fore lobe of pronotum subglobular, about as long as head or mesonotum (fig. 35A); discal cell of forewing not more than five times as long as maximum width (fig. 35M); process of pygophore spiniform (fig. 35S) . . *serripes*

Pronotum elongate, subcylindrical, twice as long as head and one and one-half times as long as mesonotum (fig. 35P); discal cell of forewing more than six times as long as maximum width; process of pygophore broad, shallowly emarginate apically (fig. 35U) . . . *fuscus*

Leistarches fuscus (McAtee and Malloch), new combination

Figure 35 O, P, U–W

Ploiaria (*Megaploiaria*) *fusca* MCATEE AND MALLOCH, 1926, p. 140, figs. 40–42.

Leistarches fuscus, the type of which has been examined, differs from *serripes* by its different color pattern, the proportions of various body parts, and the structure of the pygophore. In the only known specimen, the cross vein connecting the submarginal vein of the forewing to the anterior basal angle of the discal cell is situated slightly basad of the latter (fig. 35V). This character may be nothing but an individual variation, such as the variations that are occasionally found in *serripes* (fig. 35J, M).

DISTRIBUTION: Philippines.

TYPE: Male, United States National Museum.

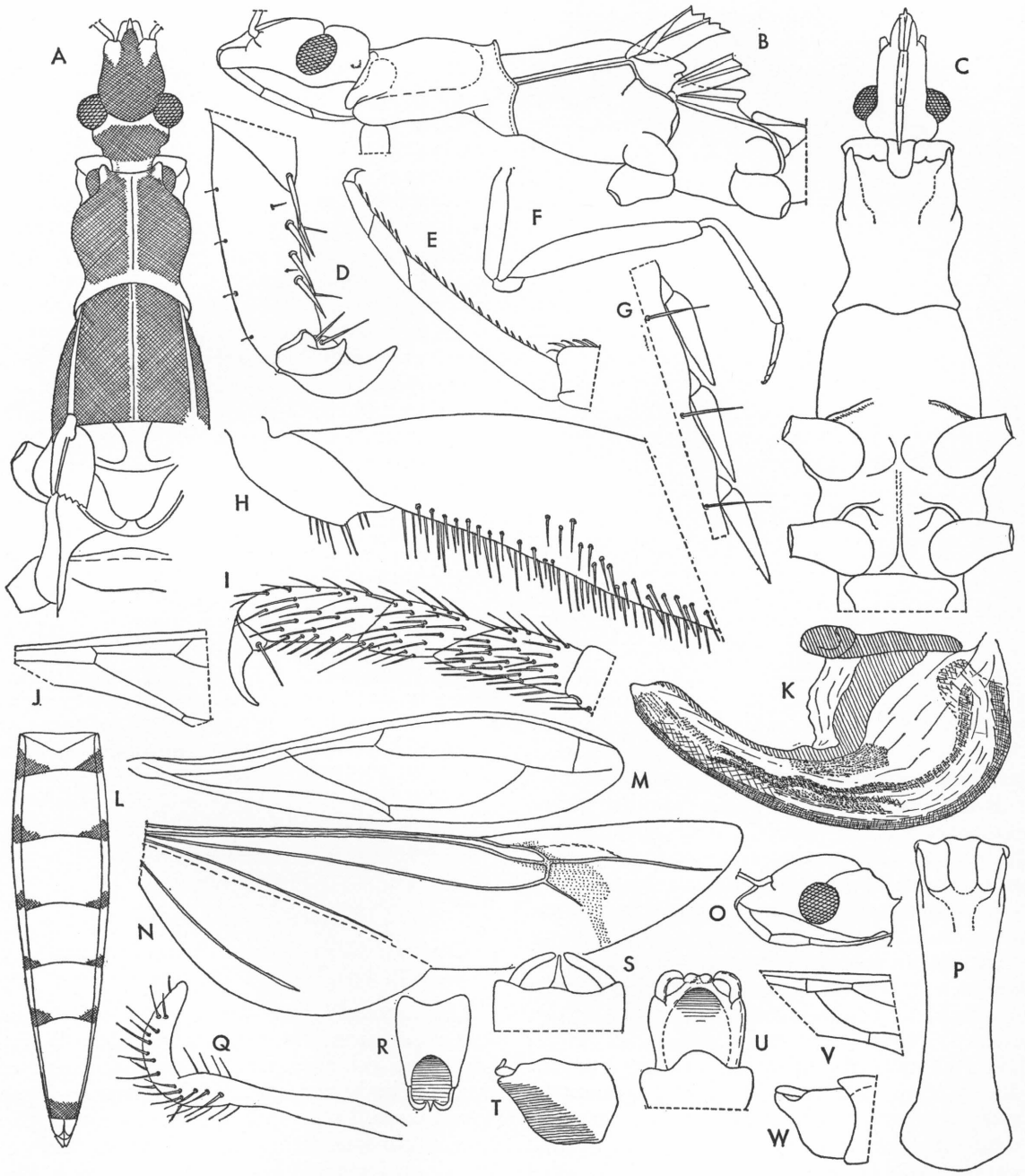


FIG. 35. A–N. *Leistarches serripes*. A. Anterior portion of body of female, dorsal view; color pattern shown on head, prothorax, and mesothorax. B. Head and thorax of female, lateral aspect. C. Head and thorax of female, seen from below. D. Apical segment of fore tarsus with claws. E. Fore tarsus. F. Foreleg. G. Spines of under surface of fore tibia. H. Trochanter and base of femur of foreleg. I. Posterior tarsus. J. Portion of forewing. K. Phallus of male, lateral view. L. Abdomen of female, ventral view, with color pattern. M. Forewing (not of specimen illustrated in J). N. Hind wing. O, P. *Leistarches fuscus*, male. O. Head, lateral aspect. P. Prothorax, ventral view. Q–T. *Leistarches serripes*, male. Q. Paramere. R. Pygophore, dorsal view. S. Apex of pygophore, seen from behind. T. Pygophore, lateral view, with color pattern. U–W. *Leistarches fuscus*, male. U. Genital region, seen from above. V. Portion of forewing. W. Genital region, side view.

Leistarches serripes Dohrn

Figure 35A–N, Q–T

Leistarches serripes DOHRN, 1860, p. 241, fig. 27.
Megaploiaria fabricii WYGODZINSKY, 1948a, p. 232, figs. 1–14.

The figures in the detailed description and those in the redescription of the male given by Wygodzinsky (1948a and 1951b) are reproduced here.

MATERIAL EXAMINED: *Tasmania* (A. Simson; South Australian Museum), one female. *Australia*: South Australia: Ronipa Hill (South Australian Museum), one female; Neeta (R. Ninniss; South Australian Museeum), one female; Murray (F. R. Zietz; South Australian Museum), one male. Victoria: Melbourne (G. F. Hill; South Australian Museum), one male; Warrnambool (Wesselmann; South Australian Museum), two females.

DISTRIBUTION: Australia, Tasmania.

TYPE: Female, Zoologisches Museum der Humboldt-Universität.

LETHIERRYA Puton

Lethierrya PUTON, 1876, p. 38.
?Bagaudella MILLER, 1952, p. 539.

A translation of the original generic description follows:

Body elongate. Head short, almost quadrangular, lacking dorsal transverse sulcus, gibbously convex behind, without ventral setae; eyes large, rather salient.

Antennae bare, very elongate, first segment three times as long as pronotum.

Pronotum produced over mesonotum; fore lobe very smooth, elongate-quadrangular, triangularly emarginate behind, parallel-sided, anterior angles toothlike; posterior lobe dull, slightly rugulose, rather strongly elevated and widened posteriorly, narrowed anteriorly.

Hemelytra attaining apex of abdomen, widened and rounded at tip, membrane with veins but lacking reticulation.

Forelegs raptorial. Coxae of forelegs as long as under surface of pronotum; trochantera lacking teeth, but with two blackish short setae; femora below with slender, bristle-like, black spines along its entire length, unequal in size; tibia and tarsus combined as long as femur and trochanter combined; tarsi not shorter than tibiae, apparently not segmented, and with a single claw.

Mid and hind legs very long and slender.

The following data, taken from the specific description, may also be significant:

Fore lobe of pronotum smooth, shining, gibbous, especially posteriorly where it is divided by a sulcus, which forms a forwardly directed angle receiving a prolongation of the hind lobe, which thus divides the fore lobe into two portions which unite above (viz., anteriorly) at center. Hind lobe opaque and delicately rugose, its hind border almost straight, humeral angles slightly elevated. Scutellum semicircular, not pointed, bordered anteriorly and at sides and possessing on disc two carinae which form a V because of their posterior fusion. Size of insect, 8 mm.

TYPE SPECIES: *Lethierrya biskrensis* Puton (monobasic).

DISTRIBUTION: North Africa.

OBSERVATIONS: As the type of the single included species is not extant, a decision on the position of the genus must await the availability of topotypical material. It may be safely assumed that *Lethierrya* is related to the group of genera around *Guithera*. The Sudanese *Bagaudella* (fig. 34K–O) is either a very close relative of *Lethierrya* or identical with it.

Lethierrya biskrensis Puton

Lethierrya biskrensis PUTON, 1876, p. 39.

DISTRIBUTION: Algeria.

TYPE: Lost.

LHOSTELLA Villiers

Lhostella VILLIERS, 1948, p. 453.

DESCRIPTION: Macropterous. Medium-sized species (10–16 mm.).

Body surface smooth, subshining, without long hairs. Color uniformly brownish, femoral-tibial articulation whitish.

Head fusiform; postocular region semiglobular, slightly truncate behind in dorsal view, distinctly separated from neck. Interocular furrow originating somewhat behind level of center of eyes, backwardly curved, in some cases surpassing level of posterior border of eyes. Eyes medium-sized. Rostrum slender, straight, not bent between first and second segments, all segments subequal in size; first approaching level of anterior, second surpassing level of posterior, border of eyes.

Antennae inserted at center of anteocular region.

Pronotum covering approximately one-third of mesonotum; fore lobe subcylindrical, slightly narrowed behind; hind lobe distinct, not much wider than fore lobe, deeply emarginated behind. Mesonotum subrectangular, very slightly convex, with a median longitudinal depression. Scutellum and metanotum lacking spine or process. Posterior border of prosternum rounded.

Forelegs moderately stout. Coxa simple. Trochanter with one or two small, spinelike setae. Femur wide, somewhat salient ventrally immediately beyond base; with two series of spinulets and slender, spinelike bristles of various sizes inserted on short, wartlike bases. Posteroventral series beginning at base of article, composed of numerous irregular rows of setae and spinulets, all becoming very short toward apex of article. Anteroventral series beginning somewhat apicad of base of posteroventral series, also composed of various series of spinulets and setae. Fore tibia slightly more than half as long as femur, produced at apex below, ventrally with one series of deflexed, strong, pointed spines. Fore tarsus two-thirds as long as tibia, three-segmented, the basal segment more than twice as long as second and third combined; segments strongly sclerotized, bare, with exception of a group of short setae on base of ventral surface of first segment. Two subequal simple claws. Mid and hind legs elongate, posterior femur surpassing apex of abdomen. Femora with rather short macrochaetae and numerous microchaetae. Tarsi of mid and hind legs slender, first and second segments subequal in size, third slightly longer than either first or second. Claws moderately curved, simple.

Forewings with discal cell as usual for the tribe, its posterior basal angle connected to submarginal vein. Pterostigma carried very near to apex of wing. Hind wings with hamus approaching Sc+R rather abruptly, fused to the latter for most of its extension. M-cu cross vein perpendicular to longitudinal axis of wing. R+M and Cu extending from level of cross vein to near wing margin, straight, simple, not connected. Transverse thickening present.

Abdomen slender, moderately narrowed at base; sternites with microchaetae and macrochaetae.

Male: Eighth sternite well developed. Pygophore large, somewhat elongate in lateral view, its anterior dorsal bridge very short; its posterosuperior border emarginate, straight across, or with a median projection. Parameres curved, their shape and chaetotaxy varied. Phallus with basal plates shorter than phallotheca and connected at base, underlain by a broad, platelike structure. Phallobase membranous, lacking projections; ventral sclerotization parallel-sided, rodlike; struts separated at extreme base only, fused for most of their length, the resulting sclerite abruptly constricted beyond middle, very narrow on apical half. Endosoma with the usual spinelike projections in large number, their size varied.

Female: Eighth and ninth tergites subhorizontal, ninth larger than eighth; apparent tenth tergite conspicuous. Gonocoxites and gonapophyses separated, the former widely exposed. Syngonapophysis deeply incised apically, the resulting lobes very prominent.

TYPE SPECIES: *Bagauda africana* Lhoste (by original designation).

DISTRIBUTION: Equatorial Africa.

OBSERVATIONS: *Lhostella* is very near *Bagauda*. Evolutionary divergence is indicated in *Lhostella* by the reduced posterior lobe of the pronotum, the fact that the two ventral series of the fore femur are composed of numerous rows of spiniform setae, and the peculiarly shaped struts of the phallosoma.

The species of *Lhostella* are very similar to one another in general structural characters and color. The best specific characters seem to be found in the male genitalia, which have been described for only some of the named species. The following key is adapted from that given by Villiers (1961).

KEY TO MALES OF THE SPECIES OF *Lhostella*

1. Interocular furrow distinctly surpassing level of posterior border of eyes (fig. 36B) . . 4
   Interocular furrow not surpassing level of posterior border of eyes (fig. 36A) 2
2. Pronotum less than twice as long as maximum width; postocular region of head regularly rounded in dorsal view . . . . . *pauliani*
   Pronotum more than twice as long as maximum width (fig. 36A); postocular region of head

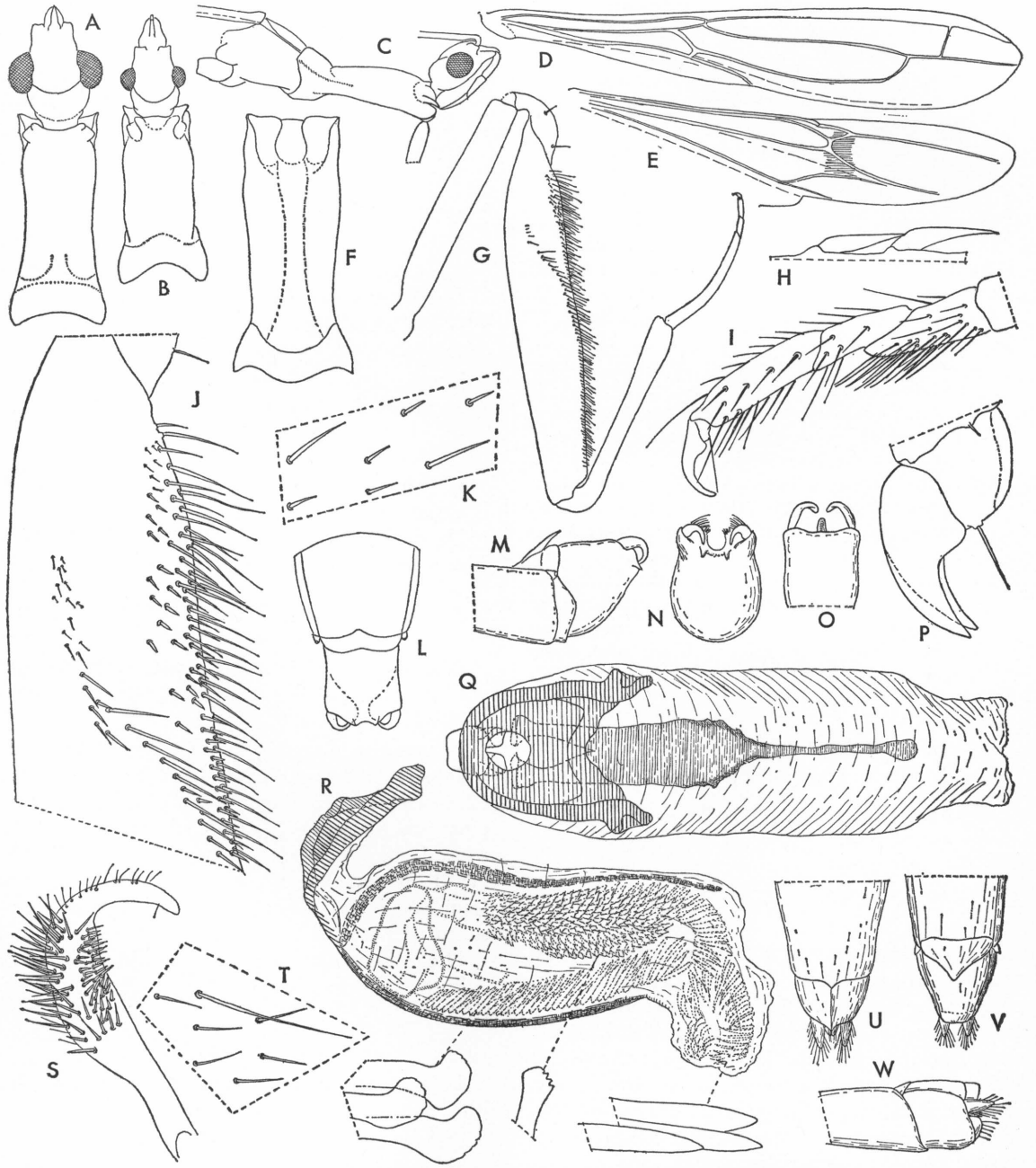


FIG. 36. A. *Lhostella villiersi*, male, head and pronotum, dorsal view. B. *Lhostella leleupi*, female, head and pronotum, dorsal view. C–E. *Lhostella villiersi*. C. Anterior portion of body of male, lateral aspect. D. Forewing. E. Hind wing. F. *Lhostella africana*, prothorax, ventral view. G–N. *Lhostella villiersi*. G. Foreleg. H. Spines of under surface of fore tibia. I. Posterior tarsus. J. Base of fore femur. K. Setae of hind femur. L. Genital region of male, ventral aspect. M. Genital region of male, side view. N. Pygophore, with parameres, seen from behind. O. *Lhostella africana*, pygophore, posterior view. P–X. *Lhostella villiersi*. P. Praetarsus and claws of forelegs. Q. Phallus, dorsal view. R. Phallus, lateral aspect, some spinelike projections of endosoma shown with high magnification. S. Paramere. T. Setae of eighth sternite of male. U. Genital region of female, ventral view. V. Genital region of female, dorsal aspect. W. Apex of abdomen of female, lateral view.

with posterolateral angles somewhat salient in dorsal view 3
3. Length, 10–12 mm.; posterosuperior border of pygophore with a slender, median projection (fig. 36 O) . . . . . *africana*
Length, 15 mm.; posterosuperior border of pygophore deeply emarginated at center (fig. 36N) . . . . . *villiersi*
4. Eyes large, wider than half of dorsal interocular distance . . . . . *cachani*
Eyes smaller, at most as wide as half of dorsal interocular distance (fig. 36B) 5
5. Pronotum strongly constricted at middle . . . . . *kindiana*
Pronotum at most slightly narrowed before posterior lobe 6
6. Distance between eyes dorsally equal to twice their width; hind lobe of pronotum about half as long as fore lobe . . . . . *meyana*
Distance between eyes dorsally more than twice their width; hind lobe of pronotum approximately one-third as long as fore lobe (fig. 36B) 7
7. Postocular region subangulate behind; pronotum rather wide, but hind not much wider than fore lobe . . . . . *congoensis*
Postocular region rounded behind; pronotum narrower, but hind lobe relatively wider (fig. 36B) . . . . . *leleupi*

Lhostella africana (Lhoste)

Figure 36F, O

Bagauda africana LHOSTE, 1939, p. 5, figs. 6, 9.
Lhostella africana: VILLIERS, 1948, p. 453, figs. 883, 885, 886 (part).
Lhostella congoensis VILLIERS, 1948, p. 455 (part).

The prosternum and the posterior aspect of the pygophore are illustrated here; the parameres are of rather uniform diameter throughout and lack the cluster of spiniform setae found in *villiersi* (see below); the phallotheca is much the same as in the latter species, including the peculiar shape of the sclerite formed by the fused basal plate struts, but the spinelike projections of the endosoma are very short, inconspicuous, and not numerous.

MATERIAL EXAMINED: Nigeria: Iseri, Lagos, July 29, 1948 (B. Malkin; the California Academy of Sciences), one male.

DISTRIBUTION: Gabun; Nigeria; Fernando Poo.

TYPE: Male, Muséum National d'Histoire Naturelle.

Lhostella cachani Villiers

Lhostella cachani VILLIERS, 1959, p. 345.

The head and prothorax have been figured by Villiers (1961).

DISTRIBUTION: Ivory Coast.

TYPE: Male, Muséum National d'Histoire Naturelle.

Lhostella congoensis (Lhoste)

Bagauda congoensis LHOSTE, 1939, p. 6, fig. 7.
Lhostella congoensis: VILLIERS, 1948, p. 453, figs. 888, 889 (part).

DISTRIBUTION: Congo (Léopoldville).

TYPE: Male, Institut Royal des Sciences Naturelles de Belgique.

Lhostella kindiana Villiers

Lhostella kindiana VILLIERS, 1961, p. 50, fig. 26.

DISTRIBUTION: Guinea.

TYPE: Male, Muséum National d'Histoire Naturelle.

Lhostella leleupi Villiers

Figures 10I; 36B

Lhostella leleupi VILLIERS, 1961, p. 49, fig. 24.
Lhostella africana: VILLIERS, 1953a, p. 33 (*nec* Lhoste).

MATERIAL EXAMINED: Congo (Léopoldville): Mt. Hoyo, cave, October 5, 1957, 1250 meters (E. Ross; the California Academy of Sciences), several females and nymphys; Mt. Hoyo, cave, August 4, 1959 (R. L. Usinger; collection Usinger), several females (R. L. Usinger; the American Museum of Natural History), one female.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Male, Musée Royal de l'Afrique Centrale.

Lhostella meyana Villiers

Lhostella meyana VILLIERS, 1962a, p. 890, fig. 10.

DISTRIBUTION: Congo (Brazzaville).

TYPE: Muséum National d'Histoire Naturelle.

Lhostella pauliani Villiers

Lhostella pauliani VILLIERS, 1961, p. 48, fig. 22.
Lhostella africana: VILLIERS, 1948, p. 453 (part, *nec* Lhoste).

DISTRIBUTION: Ivory Coast.

TYPE: Male, Muséum National d'Histoire Naturelle.

Lhostella villiersi, new species

Figure 36A, C–E, G–N, P–X

DESCRIPTION: Male and female: Length of male, 15; of female, 16 mm.

General color dark castaneous to piceous; legs somewhat more light-colored, apex of femora and base of tibiae of mid and hind legs whitish. Body surface smooth, subshining.

Head and rostrum as given in generic description and shown in figure 36A, C. Interocular furrow of male curved backward to level of posterior border of eyes, less strongly curved in female. Eyes large, their distance dorsally equal to twice their width; subcircular in lateral view, not attaining level of dorsal and ventral surfaces of head. Antennae bare. Length of first segment of male, 10 mm.; relative length of segments, 1/0.8/0.25/0.2.

Thorax as shown in figure 36A, C; posterior narrowing of fore lobe of pronotum very slightly pronounced; posterior lobe of pronotum microscopically reticulate, sides of fore lobe microscopically striate transversely.

Forelegs as given in generic description and shown in figure 36G, H, J, P. Coxa about as long as pronotum. Femur eight times as long as maximum width; its chaetotaxy as shown in figure 36G, J. Tibia and tarsi as shown in figure 36G, H, P. Mid and hind legs as given in generic description and shown in figure 36I, K; posterior femora surpassing apex of body or forewings by 8 mm.

Shape and venation of fore and hind wings as given in generic description and shown in figure 36D, E; Pcu cross vein of forewing situated only very slightly basad of level of r-m cross vein.

Structure of pygophore as shown in figure 36L–N; posterosuperior border deeply emarginated in center, angles of emargination with a cluster of short, spinelike setae; 1+1 short triangular projections laterad of emargination. Parameres (fig. 36S) strongly thickened at middle, conspicuously narrowed on apical third; thickened portion with a ventral cluster of short, and a dorsal group of more elongate, spinelike setae. Structure of phallus as shown in figure 36Q, R; platelike sclerotization underlying basal plate strongly developed; spinelike projections of endosoma large, very numerous, darkly pigmented, structure of their apices as shown in figure 36R. Structure of genital region of female as shown in figure 36U–W. Seventh sternite with a short, pointed salience at middle behind. Eighth tergite subtriangular.

MATERIAL EXAMINED: Cameroon: Lolodorf (A. I. Good; Carnegie Museum), one male holotype; Lolodorf, March 24, 1923 (A. I. Good; Carnegie Museum), one female.

OBSERVATIONS: As there is no definite evidence that these two specimens are really conspecific, and because of the slight differences in the extension of the interocular furrow and the shape of the pronotum, the female is not considered as allotype. The relatively large size and the male genitalia of this species distinguish if from its allies.

MAFULEMESA, NEW GENUS

DESCRIPTION: Macropterous. Small species (about 5 mm.).

Body surface from dull to shining, some regions heavily rugose; with short, inconspicuous pile. Color pattern striking.

Head short, truncate anteriorly in lateral view; postocular about as long as anteocular portion, subsemiglobular; neck extremely short. Interocular furrow situated slightly behind level of center of eyes. Eyes small. Rostrum straight, segments subcylindrical; second segment distinctly shorter, third slightly longer than first. Antennae inserted at anterior border of head.

Pronotum not covering mesonotum; fore lobe strongly constricted, almost pedunculate; hind lobe extremely short. Mesothorax very voluminous, as high as long; mesonotum strongly convex, with 1+1 conspicuous lateral carinae. Scutellum and metanotum lacking processes, faintly carinate longitudinally along middle. Metanotum very small as compared to mesothorax. Posterior border of prosternum acutely emarginate at middle.

Forelegs slender. Coxa and trochanter simple. Fore femur slender, parallel-sided, slightly widened at base, ventral surface with two rows of slender spines inserted on short tubercles. Posteroventral series occupying entire length of article. Anteroventral series almost as long as posteroventral series, not interrupted at base. Fore tibia and tarsus combined almost as long as femur, ventrally with one or two series of short, simple, inclined, spinelike setae. Tarsus slightly shorter

than half of length of tibia, three-segmented, first and second segments subequal in length, the third shorter; all ventrally with numerous spinelike setae similar to those on tibia, as well as a small number of bristles on all surfaces. Two small, subequal, simple claws. Femora of mid and hind legs with a few short bristles. First and second segments of mid and hind tarsi subequal in length; third much shorter, ventral surface with a few spinelike setae in addition to ordinary long bristles. Claws of mid and hind tarsi slender, simple, strongly bent subbasally.

Discal cell of forewings elongate, pointed distally, its apex approaching wing tip. M inserted on submarginal vein slightly basad of level of insertion of Pcu cross vein on cell; anterior basal angle not connected to costal margin of wing. Pterostigma almost attaining wing tip. Hind wings with hamus approaching Sc-R only, then parallel but not fused to it. Cu evanescent at some distance basad of cross vein, not attaining axillary region. M-cu cross vein perpendicular to longitudinal axis of wing, short, forming a straight line with other cross vein. R and M separate beyond cross vein, both attaining wing tip; Cu sharply bent toward hind margin of wing beyond cross vein. Anal lobe very narrow, its apex with a lobate projection; 2A apparently absent. Transverse thickening of hind wing well developed.

Abdomen strongly constricted at base in lateral, moderately widened toward posterior third in dorsal, aspect.

Male: Eighth sternite band-shaped, completely exposed. Dorsal sclerotization of pygophore occupying anterior two-thirds of its surface, its posterosuperior margin with spinelike projection. Parameres bent apically. Phallus as usual for the tribe, in invaginated condition twice as long as pygophore, thus occupying part of pregenital segments.

Female: Last tergites obliquely inclined posteriorly; genitalia not examined in detail.

TYPE SPECIES: *Mafulemesa cheesmanae*, new species.

ETYMOLOGY: Mafulu, a locality, and *Emesa*, a genus of the Emesinae.

DISTRIBUTION: New Guinea.

OBSERVATIONS: *Mafulemesa* differs from the remaining Leistarchini, in addition to other characters, by the peculiar venation of the forewings and hind wings. The voluminous mesothorax is shared only by *Phryxobothrys*, which differs from *Mafulemesa* by its normal wing venation and conspicuously modified forelegs.

Mafulemesa cheesmanae, new species

Figure 37A–U

DESCRIPTION: Male and female: Length of male, 5.3; of female, 5.5 mm.

Color of head orange-brown; piceous on anterior fourth and near antenniferous tubercles; anteocular portion with short golden pile, postocular portion bare. Rostrum shiny; first and second segments piceous, third white, slightly darker apically. Antennae piceous; first segment on basal half with nine to 10 narrow yellowish annuli which are much narrower than intervening dark portions. Pronotum whitish; dark pattern in male restricted to anterior fourth (fig. 37A, B), much more extensive in female (fig. 37C). Mesonotum orange-brown on disc, piceous toward anterior and posterior border; lateral and ventral surface of mesothorax dark orange-brown to piceous; lateral carina whitish. Scutellum and metanotum orange-brown, posterior borders piceous. Forelegs whitish; two dark annuli each on coxa, femur, and tibia (fig. 37A, D), those of male slightly more extensive than those of female; apex of coxa and trochanter with slight reddish tinge. Mid coxae and trochantera piceous, hind coxae and trochantera whitish; femora with about 18 piceous and 18 whitish annuli, latter narrower than dark ones, all distributed uniformly over entire length of segment; tibia with more than 25 narrow, whitish annuli (fig. 37A). Tarsi light brown.

Color pattern of forewings as shown in figure 37A. Dark portions fuscous, light regions hyaline, costal margin with reddish tinge. Hind wings hyaline, veins and transverse thickening pigmented.

Abdomen fuscous to piceous, pattern elements whitish, their distribution ventrally as shown in figure 37K. Parameres brownish.

Shape of head and rostrum as shown in figure 37A, B, H. Eyes small; their distance dorsally twice their width in male, three times in female; in lateral view, far removed from dorsal and ventral surface of head.

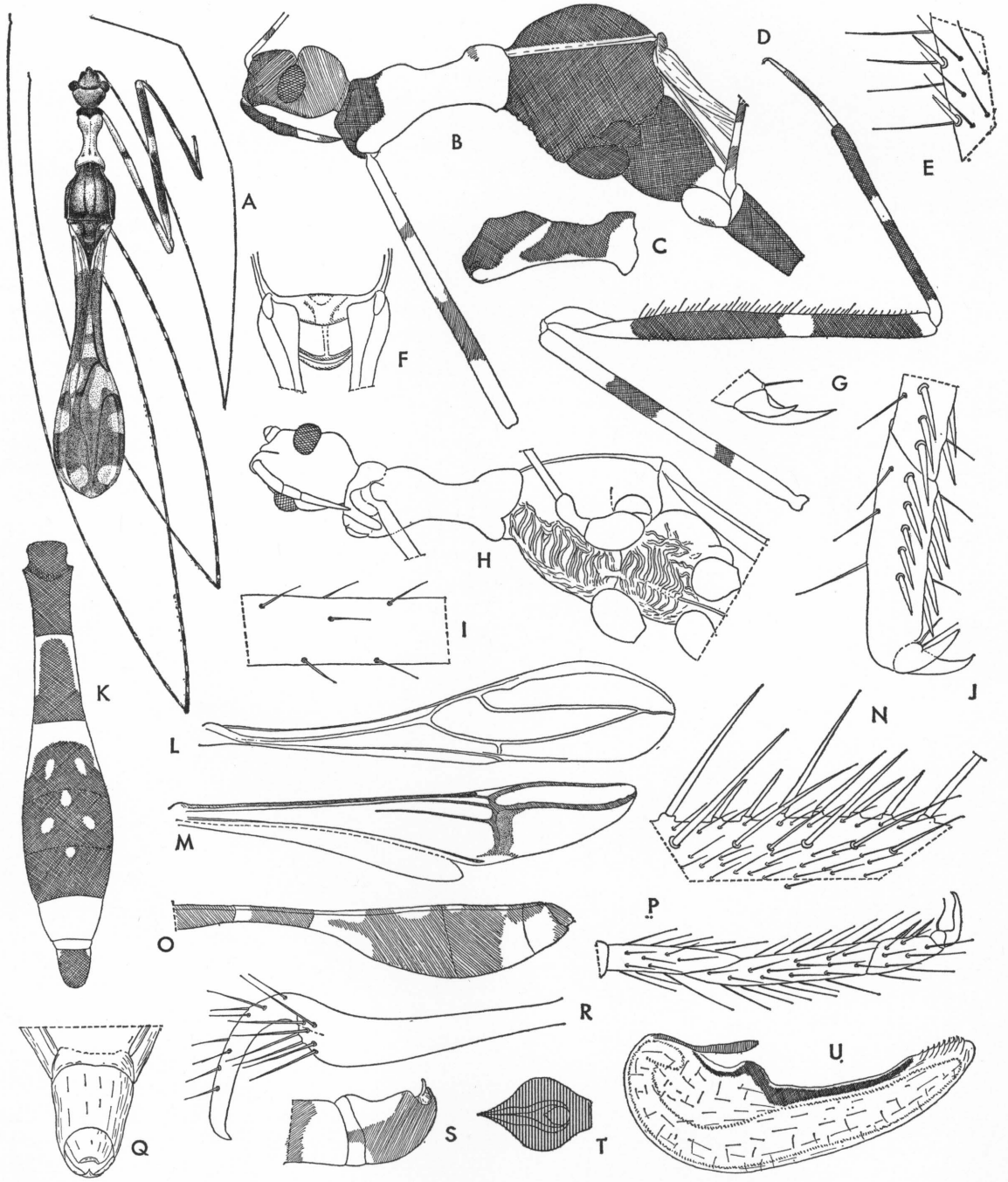


FIG. 37. *Mafulemesa cheesmanae*. A. Male, general aspect. B. Anterior portion of body of male, lateral view, with color pattern. C. Prothorax of female, side view, with color pattern. D. Foreleg, with color pattern. E. Detail of under surface of basal portion of fore tibia. F. Scutellum and metanotum. G. Claws of foreleg of female from Cyclops Mountains. H. Head and thorax of male, inferolateral view. I. Portion of posterior femur. J. Apical portion of fore tarsus with claws, specimen from Mafulu. K. Abdomen of male, dorsal view, with color pattern L. Forewing. M. Hind wing. N. Detail of under surface of fore femur. O. Abdomen of female, lateral view, with color pattern. P. Posterior tarsus. Q. Genital region of male, dorsal view. R. Paramere. S. Apex of abdomen of male, lateral aspect. T. Articulatory apparatus. U. Phallus, side view. (A drawn by Celeste Green.)

Antennae very slender, bare in both sexes. Length of first segment (male), 5 mm.; relative length of segments, 1/0.65/0.35/0.25.

Shape of pronotum as shown in figure 37A–C, H. Mesonotum as shown in figure 37A, B, H; disc strongly convex, with two faintly curved, submedian, longitudinal impressions. Scutellum and mesonotum as shown in figure 37A, F. Ventral surface of mesothorax and metathorax with very strong, conspicuous, irregularly transverse rugosity (fig. 37H).

Forelegs slender. Coxa as long as pronotum and mesonotum combined. Spines of femur as given in generic description and shown in figure 37D, N. Posteroventral series composed of about 50 smaller and larger spiniform setae, with two to five smaller setae alternating with each large one; large setae not more than half as long as diameter of segment. Anteroventral series composed of about same number of smaller and larger setae as posteroventral series. Tibia as given in generic description and shown in figure 37D, E; spiniform setae relatively short and forming a single series at base of article, becoming larger and more numerous toward apex. Tarsus and claws as given in generic description and shown in figure 37D, G, J; spiniform setae of ventral surface arranged in one row on first segment, in two on both second and third segments. Mid and hind legs as given in generic description and shown in figure 37A, I, P, very slender and elongate; hind femora surpassing apex of forewings by about 3.5 mm.

Shape and venation of forewings as shown in figure 37A, L; of hind wings, as shown in figure 37M; forewings very slightly surpassing apex of abdomen.

Shape of abdomen as shown in figure 37K, O. Male genitalia as shown in figure 37Q–U; pygophore with a median, spinelike process on posterior border; parameres small, slightly surpassing apex of process, their shape and chaetotaxy as shown in figure 37K. Phallus as illustrated in figure 37U; basal plates, as in figure 37T. Female genital region without peculiarities.

MATERIAL EXAMINED: New Guinea: Papua: Mafulu, December, 1933, January, 1934, 4000 feet [L. E. Cheesman; British Museum (Natural History)], one male holotype, one female allotype; West New Guinea, Hollandia area, West Sentani, Cyclops Mountains, June 22–24, 1959, 50 to 100 meters (J. L. Gressitt; Bernice P. Bishop Museum), one female.

OBSERVATIONS: This is named for its first collector, who has contributed so efficiently to our knowledge of New Guinea.

The female from the Cyclops Mountains differs from the typical specimens by the claws of the forelegs which are of unequal size (fig. 37G).

MILLOTINA VILLIERS

Millotina VILLIERS, 1953b, p. 33.

DESCRIPTION: Apterous female: Small species (7 mm.).

General color brownish; conspicuous pattern elements absent.

Head fusiform, fore and hind lobe moderately convex; anteocular longer than postocular region, latter semiglobular in lateral and dorsal view. Interocular furrow situated at level of center of eyes, faintly curved. Eyes small, remote from level of dorsal and ventral surface of head. Rostrum slender, bent between first and second segments; first segment short, not surpassing middle of anteocular region, second slender, slightly longer than first, attaining level of center of eyes, third the longest. Antennae inserted midway between anterior border of eyes and apex of head.

Pronotum subcylindrical, not covering mesonotum, less than twice as long as wide; hind lobe reduced to a very short transverse band. Mesonotum convex, shorter than pronotum, about as long as wide, flaring behind; metanotum half as long as mesonotum, transverse. Mesonotum and metanotum lacking processes or spines.

Forelegs slender. Coxa simple, elongate. Trochanter with several spinelike setae. Femora ventrally with three series of spinelike setae inserted on short bases. Posteroventral series beginning at base of article, composed of large and medium-sized spines, those at extreme base aggregated and inserted on a short projection. Anteroventral series beginning a considerable distance from base of femur, not interrupted basally, composed of medium-sized, spinelike setae. Accessory series composed of very short, spine-

like setae beginning at level of base of posteroventral series. Tibia slightly more than half as long as femur, slender. Tarsus slightly shorter than tibia, curved, three-segmented, strongly sclerotized, virtually bare above and at sides; first segment approximately twice as long as second and third combined, third somewhat shorter than second.

TYPE SPECIES: *Millotina pauliani* Villiers, 1953 (monobasic).

DISTRIBUTION: Madagascar.

OBSERVATIONS: No specimens have been examined by the present author; the above description is adapted from that given by Villiers. *Millotina* seems to be close to *Barrosia* Villiers; it differs from the latter by the slightly different proportions of the rostral segments and the structure of the anteroventral series of the fore femur, which is interrupted basally in *Barrosia*. The examination of a male will be necessary for the position of the genus to be decided definitely.

In addition to the type species, Villiers (1960a) also included his species *grandis* in *Millotina*. This latter species differs from *pauliani* by the possession of a large penicillate tubercle at the base of the fore femur and is here included in *Nesita*.

Millotina pauliani Villiers

Figure 25S, T

Millotina pauliani VILLIERS, 1953b, p. 34, figs. 1–4.

A few of the original drawings are here reproduced. The species was found in a cave.

DISTRIBUTION: Madagascar.

TYPE: Female, Muséum National d'Histoire Naturelle.

NESITA BERGROTH

Nesita BERGROTH, 1906a, p. 306.

Obenbergerium HOBERLANDT, 1942, p. 139 (new synonymy).

DESCRIPTION: Macropterous or apterous. Medium-sized species (10–16 mm.).

Body surface dull to subshining. General color from piceous to testaceous, with inconspicuous pattern elements.

Macropterous male: Head fusiform; anteocular slightly longer than postocular portion, somewhat elevated, its sides subparallel in dorsal view; sides of postocular region strongly converging in dorsal view, constricted at middle, angularly separated from neck. Under surface of head lacking spiniferous processes. Interocular furrow situated at about level of center of eyes, slightly backwardly curved, not attaining level of posterior border of eyes. Eyes large, approaching or attaining level of dorsal and ventral surface of head. Rostrum slender, straight, not bent between first and second segments, latter as long as, or slightly shorter than, first, attaining level of anterior but never of posterior border of eyes; third segment longer than first or second. Antennae inserted at or slightly before center of anteocular region.

Pronotum completely covering mesonotum. Fore lobe subcylindrical, more or less strongly narrowed posteriorly but not pedunculate; hind lobe from subrectangular to almost bell-shaped. Scutellum and metanotum lacking processes or spines. Upper portion of anterior acetabula angulate or with a more or less conspicuous, spinelike projection. Posterior border of prosternum very slightly rounded.

Forelegs slender. Coxa lacking spines. Trochanter bare or with from one to several spinelike setae, one inserted on a small protuberance. Femur somewhat widened toward middle, with posteroventral and anteroventral series, in some cases also with accessory series. Posteroventral series beginning at base of article with a penicillate subcylindrical process bearing apically several spiniform setae, followed by spinelike setae inserted on low, wartlike bases, in some cases intermixed with very short spines. Anteroventral series beginning somewhat distad of posteroventral series, not interrupted at base, composed of short and very short, spinelike setae. Accessory series, when present, beginning at or slightly apicad of level of base of posteroventral series, composed of a row of spinulets, which become successively shorter toward apex of femur. Fore tibiae slightly to distinctly shorter than half of length of femora, stout, ventrally with one series of strongly deflexed, short spines and one series of adpressed, somewhat more slender, spinelike setae. Tarsus curved, slightly longer than tibia, either three-segmented, with the two apical segments minute, less than one-fifth of total length of segment, or not segmented; tarsus strongly chitinized, virtually bare

above and at sides, ventrally in addition to basal field of short setae with two rows of adpressed spines or denticles. One single claw present. Mid and hind legs simple, hind femora surpassing apex of abdomen. Femora and tibiae beset with short setae of uniform size, in some cases also with intermixed, sparse, somewhat longer setae. Mid and hind tarsi stout to slender, basal segment longer than either second or third, the latter subequal; setae simple, those of first segment often very numerous; claws slender, curved, their structure simple.

Forewings slightly surpassing apex of abdomen. Discal cell as usual for the tribe, its posterior basal angle connected to submarginal vein by a complete cross vein, the cross vein arising from anterior basal angle of cell present, but incomplete. Apex of pterostigma falling short of wing tip. Apical portion of wing with veinlike reticulations. Hind wing with hamus approaching Sc+R only very gradually, joining latter only on basal half. M-cu cross vein curved; Cu not extending beyond cross vein. R+M extending from level of cross vein to wing tip, subbasally with a short, backwardly directed, stumplike branch.

Abdomen slender, subcylindrical, somewhat narrowed at base. Connexival margins entire, forming continuous outline. Setae of sternites of one or two, not invariably very distinctive sizes. Seventh tergite short, not covering genitalia from above. Eighth sternite partly hidden by seventh, not attaining dorsal portion of body. Pygophore medium-sized, subsemicircular in lateral view, its anterior dorsal bridge very short; posterosuperior border with a long slender spine. Parameres long and slender, strongly curved, pointed apically. Phallus symmetrical. Phallotheca membranous; ventral sclerotization well developed; dorsal sclerotization weak, not elevated apically above phallotheca wall (*fide* Villiers, 1949a). Endosoma with 1+1 longitudinal groups of teeth.

Apterous male: General characters like those in winged male. Eyes very small. Pronotum subcylindrical, elongate, three to six times as long as wide, somewhat constricted at posterior third; hind lobe very short, not distinctive, leaving mesonotum entirely exposed. Mesonotum about twice as long as wide, from one-half to two-thirds as long as pronotum. Metanotum about as long as wide, approximately half as long as mesonotum. Pygophore somewhat larger than that of winged form; dorsal bridge extensive.

Apterous female: General characters like those of apterous male. Abdomen narrow at base, fusiform or from gradually to abruptly widened on fourth through sixth segments, seventh narrowed again.

Posterior tergites frequently tuberculate at middle. Eighth tergite very short, transverse, rounded behind, subhorizontal. Ninth tergite subrectangular, obliquely inclined posteriorly, transverse or longer than wide, straight or emarginated behind. Gonocoxites and gonapophyses separated. Syngonapophysis deeply incised apically.

TYPE SPECIES: Of *Nesita*, *Nesita polymorphus* Bergroth (by subsequent designation, Villiers, 1949a). Of *Obenbergerium*, *Obenbergerium donativum* Hoberlandt (monobasic).

DISTRIBUTION: Madagascar.

OBSERVATIONS: This genus agrees in most characters with *Orthunga*, with which it possibly shares a recent common ancestor. *Nesita* differs mainly by the loss of the spiniferous tubercles of the under side of the head.

Hoberlandt (1942) distinguished his *Obenbergerium* from *Nesita* by the spiniform process of the upper portion of the fore acetabula, the presence of several spinelike setae on the fore trochanter, an accessory series of short spines on the fore femur, and the presence of tubercles on the posterior abdominal tergites. Villiers (1953b) described a second species of *Obenbergerium* based on an apterous female, as is the type species. Some typical females of *Nesita* also possess tubercles on the posterior abdominal tergites. The length of the process of the anterior acetabula is no more than a specific character, just as is the number of spinelike setae on the trochanter. The only remaining differential character, viz., the presence of an accessory series of spinulets on the fore femur, is by itself not sufficient for a generic separation. A male of the species described as *Nesita seyrigi* Villiers, now before me, possesses the accessory series (fig. 38C) not mentioned by its author. It is concluded that the separation between *Nesita* and *Obenbergerium* cannot be maintained.

Bergroth, when describing *Nesita*, included

two species, *polymorphus* and *annulosus*, both new; the former is the type. *Annulosus* differs from *polymorphus* by the lack of the penicillate process of the fore femur. Though no specimens could be examined, it is considered that *annulosus* does not belong in *Nesita*, and it is here listed as a species *incertae sedis*.

Nesita derelictus, from Lord Howe Island, differs in many aspects from Madagascan *Nesita*, a fact not clearly appreciated at the time of its description (Wygodzinsky, 1956). It is believed that leaving the Madagascan species and *derelictus* in the same genus is apt to suggest "circumantarctic" relationships for which no evidence is present in this case. Consequently, *derelictus* is now made the type of a separate genus, and *Nesita* is once more restricted to Madagascar.

Villiers (1960e) described an apterous leistarchine from Madagascar which he placed in his genus *Millotina*. The species, *grandis*, agrees with *Millotina* in the three-segmented fore tarsus, but differs from it by the absence of a bend between the first and second rostral segments, by the much longer prothorax, the length of the fore tarsus which is greater than the tibia, and mainly by the presence of a penicillate process at the base of the fore femur. The characters mentioned all agree with those of *Nesita*. As shown in the present paper, several emesine genera of otherwise rather uniform morphology may contain, side by side, species with unsegmented and others with segmented fore tarsi. It is concluded that, as *grandis* and another species described below are so close to typical *Nesita*, they should be included in this genus as a separate subgenus, *Paranesita*.

KEY TO THE SUBGENERA OF *Nesita*

Fore tarsus not segmented (fig. 38N) . . . . . *Nesita* (*Nesita*)

Fore tarsus three-segmented, the two apical segments very small (fig. 39C) . . . . . *Nesita* (*Paranesita*)

NESITA (NESITA) BERGROTH

Nesita BERGROTH, 1906a, p. 306.

The subgenus is defined by its undivided fore tarsus.

TYPE SPECIES: *Nesita polymorphus* Bergroth.

DISTRIBUTION: Madagascar.

KEY TO THE SPECIES OF *Nesita* (*Nesita*) (ADAPTED FROM VILLIERS, 1949A)

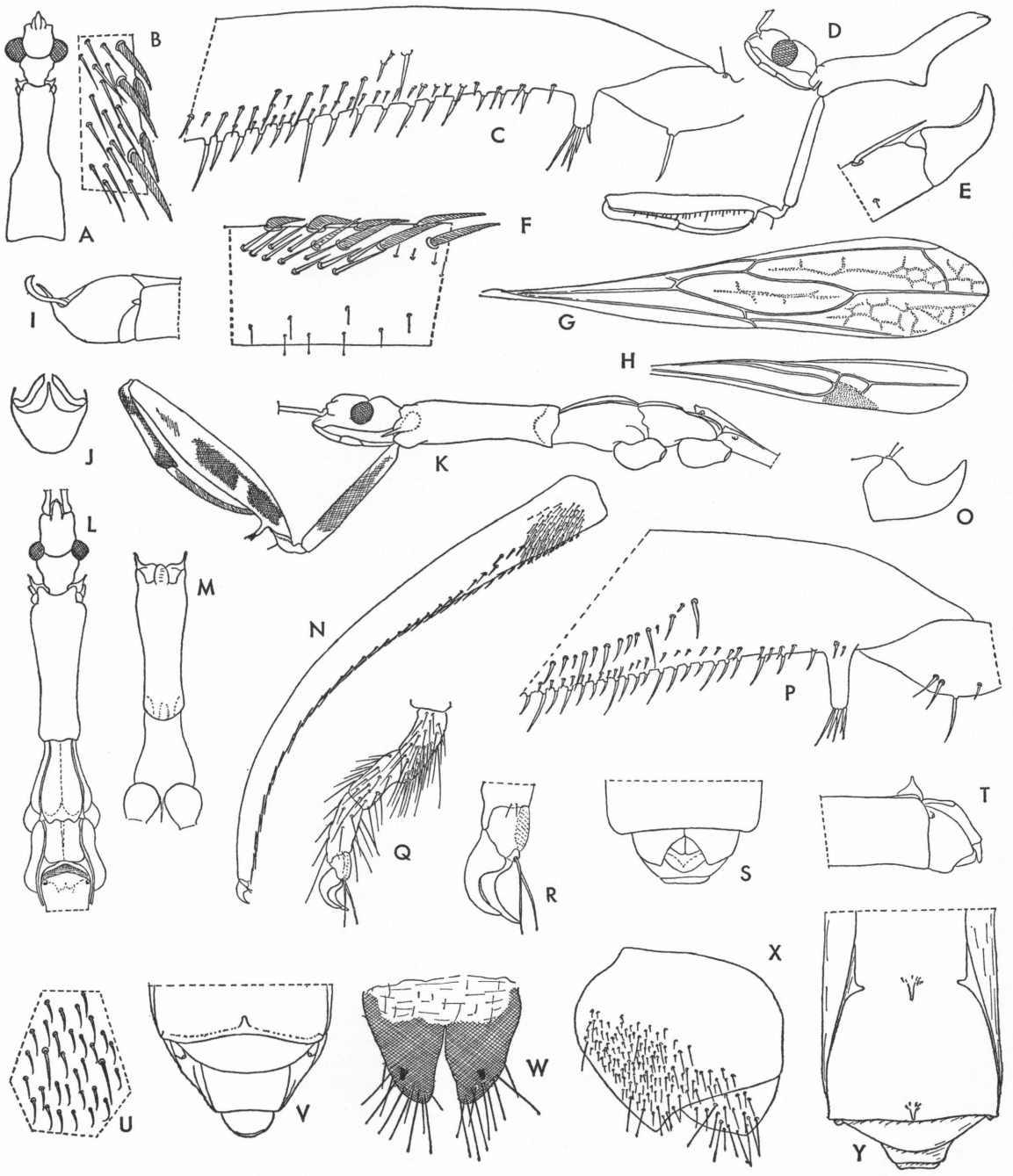
1. First segment of antennae with numerous dark and light annuli 2
   First antennal segment with no more than two annuli in the apical region 3
2. First antennal segment with a dozen brown annuli; connexival margin of female with three dentiform projections . . *noualhieri*
   First antennal segment with five annuli; connexival margins of female lacking projections . . . . . *polymorphus*
3. Body entirely piceous . . . . . *piceus*
   Body testaceous, with more or less extensive dark pattern elements 4
4. Apex of first antennal segment piceous . . 6
   Apex of first antennal segment broadly whitish 5
5. Male as shown in figure 38A–H; abdomen of female moderately widened posteriorly, not clavate . . . . . *seyrigi*
   Abdomen of female clavate . . . . . *madagascariensis*
6. Size, 15 mm. or more; upper portion of anterior acetabula with a downwardly and forwardly directed, conspicuous, spinelike projection (fig. 38K); fore femur with accessory series of short spinulets (fig. 38P) . 7
   Size, 14.5 mm. or less; upper portion of anterior acetabula not spinelike; fore femur (invariably?) lacking accessory series . . 8
7. Fore femur 10 times as long as maximum width, its color tawny . . . . . *villiersi*
   Fore femur no more than 6.5 times as long as wide, light colored, with two conspicuous elongate dark spots on basal half (fig. 38K) . . . . . *donativus*
8. Fore femora brown, or flavous with brown annuli, and with only a few faint round spots 9
   Fore femora flavous, with brown annuli and numerous round brown spots . . *alluaudi*
9. Head and pronotum mainly flavous below, brown laterally 10
   Head and pronotum yellowish brown below and laterally . . . . . *clavatus*
10. Fore femora flavous with two elongate brown spots laterally . . . . . *maculatus*
    Fore femora flavous with three wide brown annuli . . . . . *gracilis*

Nesita (Nesita) alluaudi Villiers

Nesita alluaudi VILLIERS, 1949a, p. 343, figs. 207, 212, 213.

DISTRIBUTION: Madagascar.

TYPE: Female, Muséum National d'Histoire Naturelle.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y

Nesita (Nesita) clavatus Villiers

Nesita clavatus VILLIERS, 1949a, p. 343, figs. 208, 214–216.

DISTRIBUTION: Madagascar.
TYPE: Female, Muséum National d'Histoire Naturelle.

Nesita (Nesita) donativus (Hoberlandt)

Figure 38K–Y

Obenbergerium donativum HOBERLANDT, 1942, p. 140, figs. 5–9.

A specimen now before me [Madagascar: Antanemora, 300 meters, December 11, 1959 (E. Ross; the California Academy of Sciences)] agrees fairly well with the description of *donativus*, though some of the proportions are slightly different. It is illustrated here in some detail.

DISTRIBUTION: Madagascar.
TYPE: Female, lost.

Nesita (Nesita) gracilis Villiers

Nesita gracilis VILLIERS, 1949a, p. 345.

DISTRIBUTION: Madagascar.
TYPE: Male, Muséum National d'Histoire Naturelle.

Nesita (Nesita) maculatus Villiers

Nesita maculatus VILLIERS, 1949a, p. 344, fig. 217.

DISTRIBUTION: Madagascar.
TYPE: Female, Muséum National d'Histoire Naturelle.

Nesita (Nesita) madagascariensis Hoberlant

Nesita madagascariensis HOBERLANDT, 1942, p. 136, figs. 1–4.

DISTRIBUTION: Madagascar.
TYPE: Female, National Museum, Prague.

Nesita (Nesita) noualhieri Villiers

Nesita noualhieri VILLIERS, 1949a, p. 339, figs. 193–198.

DISTRIBUTION: Madagascar.
TYPE: Muséum National d'Histoire Naturelle.

Nesita (Nesita) piceus Villiers

Figure 38I, J

Nesita piceus VILLIERS, 1949a, p. 340, figs. 199–203.

The illustrations of the male genitalia reproduced here are taken from the original description.

DISTRIBUTION: Madagascar.
TYPE: Male, Muséum National d'Histoire Naturelle.

Nesita (Nesita) polymorphus BERGROTH

Nesita polymorphus BERGROTH, 1906a, p. 307.

DISTRIBUTION: Madagascar.
TYPE: Unknown.

Nesita (Nesita) seyrigi Villiers

Figure 38A–H

Nesita seyrigi VILLIERS, 1949a, p. 341, figs. 204–206, 209–211.

A macropterous male received from A. Villiers for study is here figured in detail. The genitalia could not be fully examined.

DISTRIBUTION: Madagascar.
TYPE: Male, Muséum National d'Histoire Naturelle.

Nesita (Nesita) villiersi, new name

Obenbergerium seyrigi VILLIERS, 1953b, p. 35, fig. 5.

The transfer of the species *seyrigi* to *Nesita* makes the adoption of a new name mandatory.

FIG. 38 (OPPOSITE PAGE). A–H. *Nesita seyrigi*, macropterous male. A. Head and pronotum, dorsal view. B. Detail of under surface of fore tibia. C. Trochanter and base of fore femur. D. Anterior portion of body, lateral view. E. Apex of fore tarsus and claws. F. Portion of base of fore tarsus. G. Forewing, with color pattern. H. Hind wing. I, J. *Nesita piceus*, male. I. Genital region, lateral view. J. Pygophore, with parameres, seen from behind. K–Y. *Nesita donativus*, female. K. Anterior portion of body, lateral view. L. Anterior portion of body, as seen from above. M. Prothorax and mesothorax, ventral aspect. N. Fore tarsus. O. Claw of foreleg. P. Trochanter and base of fore femur. Q. Posterior tarsus. R. Praetarsus and claws of hind leg. S. Genital region, ventral view. T. Apex of abdomen, lateral aspect. U. Setae of posterior femur. V. Apex of abdomen, posterior view. W. Syngonapophysis. X. Gonocoxites with gonapophysis. Y. Apical portion of abdomen, seen from above. (I and J adapted from Villiers, 1949a.)

DISTRIBUTION: Madagascar.

TYPE: Female, Muséum National d'Histoire Naturelle.

NESITA (PARANESITA), NEW SUBGENUS

This subgenus differs from the typical one by the three-segmented fore tarsi, as mentioned in the key.

TYPE SPECIES: *Millotina grandis* Villiers.

DISTRIBUTION: Madagascar.

KEY TO THE SPECIES OF *Nesita* (*Paranesita*)

Mesonotum two-thirds as long as pronotum; fore femur less than seven times as long as wide (fig. 39H); anteocular and postocular regions of head strongly elevated (fig. 39H) . . *grandis*

Anteocular and postocular regions of head less strongly elevated (fig. 39B); mesonotum not more than half as long as pronotum (fig. 39A, B); fore femur about 10 times as long as wide (fig. 39B) . . . . . *villiersi*

Nesita (Paranesita) grandis (Villiers), new combination

Figure 39H

Millotina grandis VILLIERS, 1960e, p. 26, fig. 14.

DISTRIBUTION: Madagascar.

TYPE: Female, Muséum National d'Histoire Naturelle.

Nesita (Paranesita) villiersi, new species

Figure 39A–G, I–K

DESCRIPTION: Apterous female: Length, 12.4 mm.; head, 1.5; thorax, 3.5; abdomen, 7.4 mm.

General color castaneous. Antennae and rostrum of the general body color. Legs ochraceous; apex of fore femur and entire tibia and tarsus flavous; apical third of mid and hind femora fuscous, this dark area with a central white annulus; mid and hind tibiae darkened on basal fourth, with a whitish subbasal annulus much narrower than that of femora, and much closer to femoral-tibial articulation. Body surface shining, with minute, rather dense, depressed pilosity.

Head and rostrum as shown in figure 39A, B. Anteocular and postocular regions not strongly convex. Eyes small, their distance dorsally slightly more than twice their width; circular in lateral view, remote from level of ventral and dorsal surfaces of head. Length of first antennal segment, 9 mm.; relative length of segments, 1/0.8/0.22/0.21.

Prothorax as shown in figure 39A, B. Pronotum three times as long as wide, its posterior border salient at middle. Mesonotum about half as long as pronotum and not quite twice as long as wide, conspicuously convex, faintly sulcate longitudinally along middle. Metanotum half as long as mesonotum and as long as wide, its disk strongly elevated on both sides of median longitudinal depression.

Forelegs as shown in figure 39B, C, E, F. Trochanter without distinct spiniform setae, with only a few hairs. Femur slightly S-shaped, 10 times as long as its maximum width. Basal penicillate process slightly shorter than diameter of segment, with three apical spines. Posteroventral series composed of approximately 35 medium-sized and short, strongly sclerotized, spinelike setae. Anteroventral series composed of about 40 similar but shorter setae. Accessory series beginning slightly apicad of penicillate process, consisting of a large number of small to minute setae. Tibia one-third as long as femur, the spiniform setae and spines of its under surface as shown in figure 39F. Tarsus slightly longer than tibia; spines of its under surface as shown in figure 39E. Mid and hind legs long, posterior femora surpassing apex of abdomen by 5.5 mm. Chaetotaxy of mid and hind femora and tibiae as shown in figure 39D; tarsi, in figure 39-K.

Abdomen elongate-fusiform (fig. 39G); limits between segments not distinct except on posterior portion. Dorsal surface simple. Genital region as shown in figure 39G, J; syngonapophysis very prominent.

MATERIAL EXAMINED: Madagascar: Ambontoaka, 450 meters, February 4–14, 1934 (Olsufiev; Zoological Institute of the Academy of Sciences, Leningrad), one female holotype.

OBSERVATION: This species, named for A. Villiers, who has done so much to further our knowledge of the Reduviidae of Madagascar, differs from *grandis* as shown in the key.

ORTHUNGA DOHRN

Iccius DOHRN, 1859, p. 52 (*nomen oblitum*).
Orthunga DOHRN, 1859, p. 105.

DESCRIPTION: Macropterous or apterous. Small to medium-sized species (8–19 mm.).

Body surface dull to slightly shining. Gen-

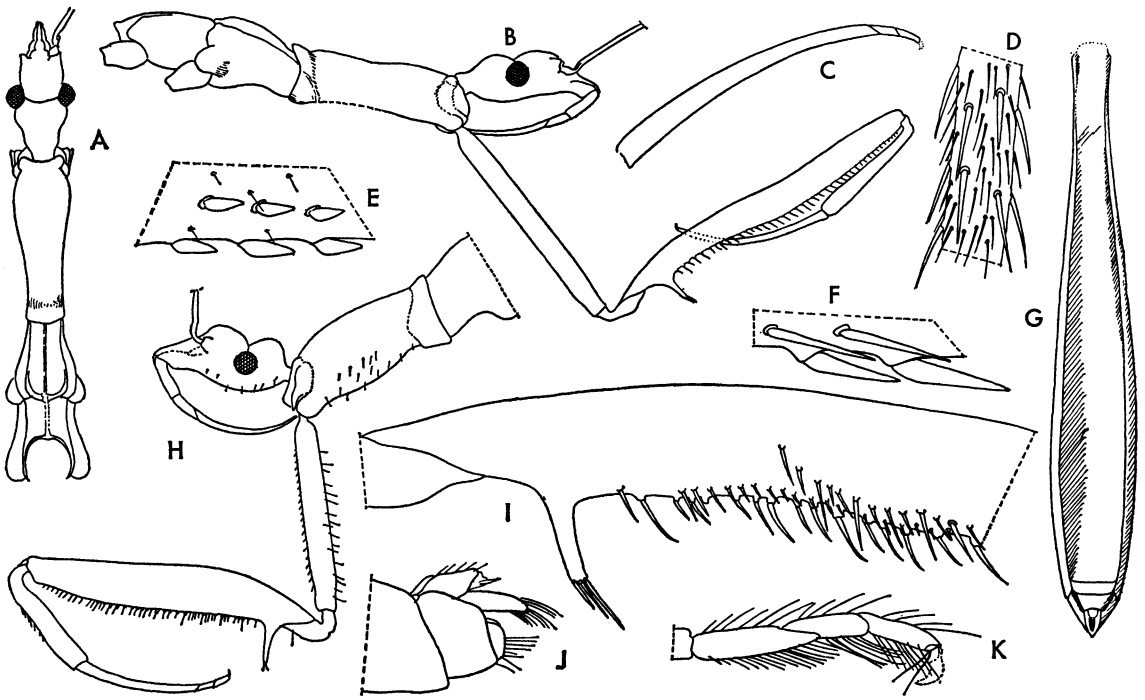


FIG. 39. A–G. *Nesita villiersi*, female. A. Head and thorax, dorsal view. B. Anterior portion of body lateral aspect. C. Fore tarsus, outline. D. Portion of hind tibia. E. Spines of under surface of fore tarsus. F. Spines of under surface of fore tibia. G. Abdomen, seen from above. H. *Nesita grandis*, female, anterior portion of body, lateral view. I–K. *Nesita villiersi*, female. I. Base of fore femur. J. Apex of abdomen, lateral view. K. Hind tarsus. (H adapted from Villiers, 1960e.)

eral color somber, more or less extensively marbled or spotted with yellowish.

Macropterous male: Head fusiform; anteocular generally longer than postocular portion, somewhat elevated, its sides subparallel in dorsal view; sides of postocular region in dorsal view slightly rounded immediately behind eyes, then convergent posteriorly and somewhat constricted before posterior constriction, which separates head from distinct neck. Under surface of head with three, rarely four, pairs of conspicuous spiniferous tubercles. Interocular furrow situated at or before level of center of eyes, slightly backwardly curved, not attaining level of posterior border of eyes. Eyes large, approaching level of under surface of head. Rostrum stout, straight, not curved between first and second segments; first not reaching much beyond level of antenniferous tubercle, second slightly shorter than first, reaching to about level of middle of eye, third longer than first or second. Antennae inserted at middle of anteocular portion.

Pronotum completely covering mesonotum; fore lobe subcylindrical, more or less narrowed posteriorly, in some cases slightly pedunculate; hind lobe subrectangular to elongate bell-shaped. Scutellum and metanotum lacking processes or spines. Upper portion of anterior acetabula generally with a spinelike, forwardly and downwardly directed projection. Posterior border of prosternum straight across.

Forelegs stout. Coxa on inner surface subapically with a few short spines. Trochanter with from one to three spinelike setae. Femur distinctly widened toward middle, with posteroventral, anteroventral, and accessory series. Posteroventral series beginning at base of article, with a subcylindrical penicillate process with approximately five apical spines, followed by numerous small spines inserted on short tubercles, intermixed with spinelike

setae inserted on wartlike protuberances. Anteroventral series beginning somewhat distad of posteroventral series, not interrupted at base, composed of medium-sized and short, spinelike setae. Accessory series beginning at level of base of posteroventral series, composed of a row of spinulets, which become successively shorter toward apex of article. Fore tibia slightly shorter than, fore tarsus slightly longer than, half of length of femur, both combined as long as that article. Tibia ventrally with one series of strongly deflexed short spines and one series of adpressed, slender, spinelike setae. Tarsus not segmented, strongly chitinized, virtually bare above and at sides, ventrally with two rows of adpressed, slender, spinelike setae, in addition to basal group of short, semierect setae. One single, simple claw present. Mid and hind legs simple, hind femora surpassing apex of abdomen; femora beset either with short setae of uniform type or with isolated longer and very numerous short spinulets. Mid and hind tarsi slender, basal segment longest, almost as long as second and third combined, second slightly shorter than third; setae simple; claws slender, curved, simple.

Forewings with discal cell as usual for tribe, its posterior basal angle invariably, its anterior basal angle in some cases, connected to submarginal veins by a cross vein. Apex of pterostigma falling short of wing tip. Hind wings with hamus approaching but not joining Sc+R. M-cu cross vein curved; Cu not extending beyond cross vein. R+M absent or extending from level of cross vein to wing tip, in latter case subbasally with a short, stumplike, backwardly directed branch.

Abdomen slender, more or less strongly narrowed at base. Connexival margins entire, forming a continuous outline. Setae of sternites of two not invariably clearly different sizes. Seventh tergite very short, not covering genitalia from above. Eighth sternite from small to very small, not attaining level of dorsal portion of abdomen. Pygophore medium sized, subsemicircular to posteriorly truncate in lateral view, its anterior dorsal bridge very short. Parameres elongate-cylindrical, curved apically, with rather long setae. Phallus symmetrical. Basal plates diverging; basal plate bridge situated at about middle of total length of basal plates. Phallotheca membranous. Ventral sclerotization narrow, occupying basal half of phallotheca only, connected and almost fused proximally to basal plate. Dorsal sclerotization apically elevated above phallotheca wall. Struts fused for their whole length, forming a slender, parallel-sided sclerite. Endosoma with 2+2 elongate groups of teeth, those of dorsal groups broadly triangular, those of ventral groups slender, spinelike.

Apterous male: General characters like those of winged male. Eyes very small. Pronotum subcylindrical, narrowed posteriorly; hind lobe very short, collar-like, leaving mesonotum entirely exposed; latter about half as long as pronotum, metanotum even shorter. Abdomen in some cases strongly widened, tergites tuberculate at center.

Apterous female: General characters like those of apterous male. Abdomen generally strongly widened posteriorly, its shape from clavate to pedunculate. Posterior tergites generally tuberculate at middle. Eighth tergite short, much wider than long, subhorizontal. Ninth tergite vertical,trapezoidal, more or less elongated, invariably longer than eighth. Gonocoxites and gonapophyses separated. Syngonapophysis deeply incised apically.

TYPE SPECIES: *Emesa wahlbergi* Dohrn (monobasic).

DISTRIBUTION: Ethiopian Region (equatorial and South Africa; Madagascar; Comores).

OBSERVATIONS: Though dating from 1859, the genus was not formally described by Dohrn until 1860.

Dr. R. Hussey has called my attention to the fact that Dohrn (1859) has validated *Iccius* by listing it with a single, previously described species. In the "Emendanda et Corrigenda" of the same work, Dohrn renamed *Iccius* as *Orthunga*, a name thereafter used by Dohrn (1860) himself and by all subsequent authors. Article 23(b) of the International Code of Zoological Nomenclature, adopted by the XV International Congress of Zoology, London, July, 1958, stated that "a name that has remained unused as a senior synonym in the primary zoological nomenclature for more than fifty years is to be considered a forgotten name (*nomen oblitum*)." This rule of limitation

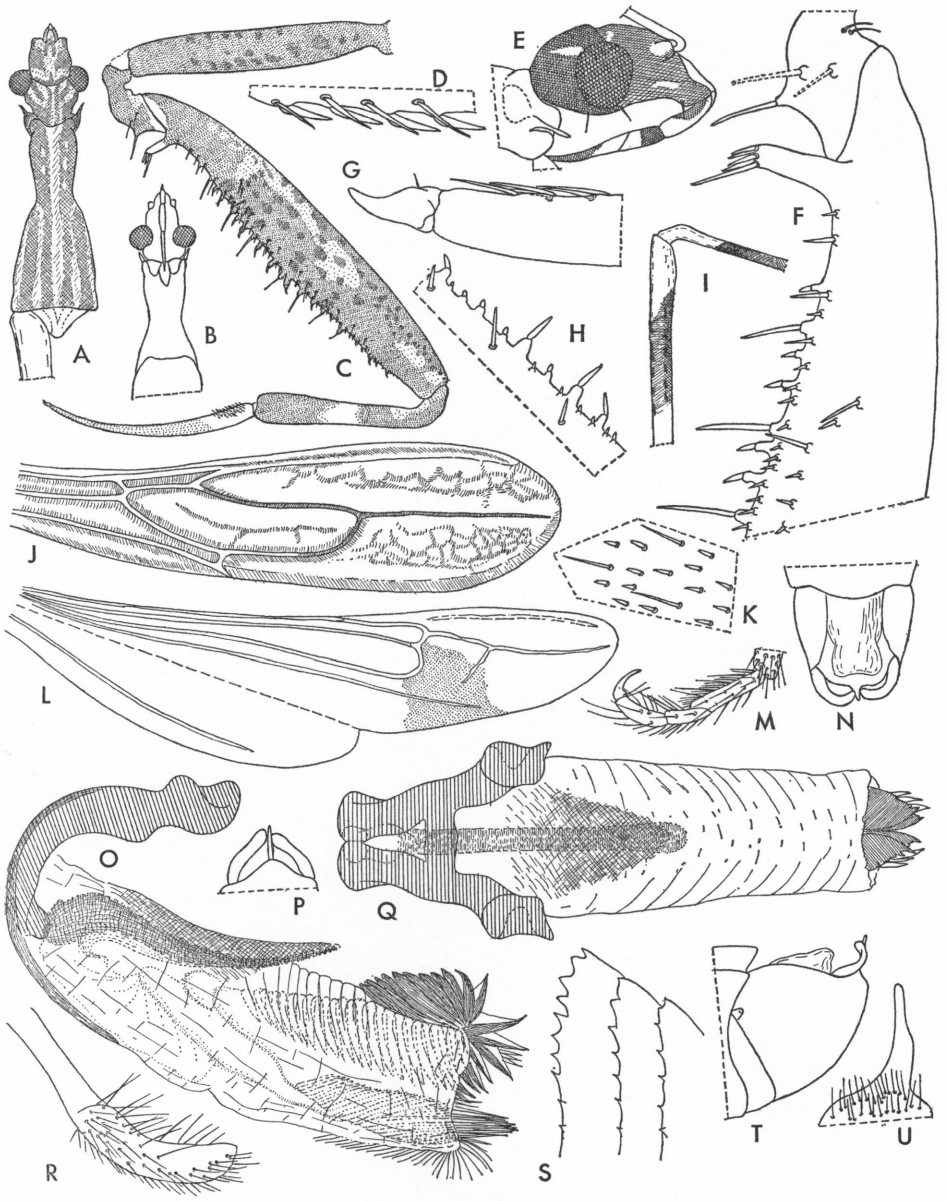


FIG. 40. *Orthunga wahlbergi*, macropterous male. A. Head and thorax, dorsal view, with color pattern. B. Head and prothorax, seen from below. C. Foreleg, with color pattern. D. Spines of under surface of fore tibia. E. Head, lateral view, with color pattern. F. Trochanter and base of fore femur. G. Apex of fore tarsus with claw. H. Under surface of apical portion of fore femur. I. Femurotibial articulation of hind leg, with color pattern. J. Forewing, with color pattern. K. Setae of hind femur. L. Hind wing. M. Posterior tarsus. N. Genital region, seen from above. O. Phallus, lateral view. P. Apex of pygophore with parameres, seen from behind. Q. Phallus, dorsal view. R. Paramere. S. Detail of spines of endosoma, high magnification. T. Genital region, side view. U. Posterior projection of pygophore, lateral aspect.

certainly applies to *Iccius*. An application is presently being made to the Commission to place *Iccius* on the Official Index of Rejected Names, and *Orthunga* is used in the present paper.

This is one of the emesine genera with conspicuous pterygopolymorphism. All known females are apterous; males are either winged or apterous.

This pterygopolymorphism makes a correct correlation of both sexes not always easy, and it is imaginable that certain specific names may in reality apply to the alternate sex of another named species. These circumstances, combined with the great similarity of the winged males of different species, make identification difficult and stand in the way of a better understanding of the genus.

KEY TO THE SPECIES OF *Orthunga*
(ADAPTED FROM VILLIERS, 1949A, 1951)

1. Winged males 2
   Apterous males and females 8
2. Second pair of spiniferous tubercles of under surface of head situated distinctly at or before level of anterior border of eyes (fig. 41B) 3
   Second pair of spiniferous tubercles of under surface of head situated distinctly posterior to level of anterior border of eyes (fig. 40E) 4
3. Distance between eyes dorsally distinctly larger than width of eyes; first segment of antennae testaceous, with a brown apical annulus . . . . . *guineensis*
   Eyes distinctly wider than their distance dorsally (fig. 41A); first segment of antennae ochraceous, piceous subapically, distally with a wide white annulus . . . . . *motute*
4. Portion of Cu situated apicad of Pcu cross vein, as long as or shorter than portion situated between Pcu cross vein and base of discal cell 5
   Apical portion distinctly longer than basal portion (fig. 40J) 6
5. Apical portion of Cu approximately as long as basal portion; cross vein connecting anterior basal angle of discal cell and submarginal vein a direct continuation of Cu . . . . . *lineata*
   Apical portion of Cu shorter than basal portion; cross vein mentioned situated slightly distad of junction of Cu with R+M . . . . . *uelensis*
6. Hind lobe of pronotum brown, with three longitudinal, yellowish bands on disc (fig. 40A) 7
   Hind lobe of pronotum yellowish, with poorly defined brownish bands . *delattrei*
7. Anterior basal angle of discal cell of forewings connected to submarginal vein by a well-developed cross vein (fig. 40J); forewings not distinctly surpassing apex of abdomen . . . . . *wahlbergi*
   Cross vein mentioned absent; forewings distinctly surpassing apex of abdomen . . . . . *overlaeti*
8. Males 9
   Females 13
9. Fore femora testaceous, more or less distinctly variegated with brown 10
   Fore femora uniformly piceous . . *sicardi*
10. Size, 13 mm. . . . . *arborea*
    Size, 10 mm. or less 11
11. Second pair of spiniferous tubercles of under surface of head situated before level of anterior border of eyes 12
    Second pair of spiniferous tubercles situated behind level of anterior border of eyes . . . . . *lineata*
12. Mesothorax twice as long as wide at base . . . . . *feai*
    Mesothorax distinctly more than twice as long as wide at base (fig. 42B) . . . *testacea*
13. Mesothorax less than twice as long as wide at base (fig. 42A) 14
    Mesothorax distinctly more than twice as long as wide at base (fig. 42B) . *testacea*
14. Head ventrally with three pairs of spiniform setae 15
    Head ventrally with four pairs of spiniform setae . . . . . *octospinata*
15. Upper portion of anterior acetabula extended into a long spine which surpasses considerably anterior border of prosternum (fig. 42C) 16
    Upper portion of anterior acetabula very short, hardly surpassing anterior border of prosternum . . . . . *feai*
16. Fore femur uniformly piceous; apex of mid and hind femora broadly annulated with dark . . . . . *sicardi*
    Fore femur not uniformly piceous; apex of mid and hind femora either narrowly annulated with dark or broadly white 17
17. Size, less than 10 mm.; mid and hind femora with a wide, white, apical annulus . . . 18
    Size, 19 mm.; hind femora with a narrow, apical, dark annulus preceded by a wide, subapical, white one . . . . . *ogoouensis*
18. Tubercles of center of abdominal tergites very small, difficult to observe (fig. 42A); ninth tergite somewhat longer than wide at apex (fig. 42I) . . . . . *motute*

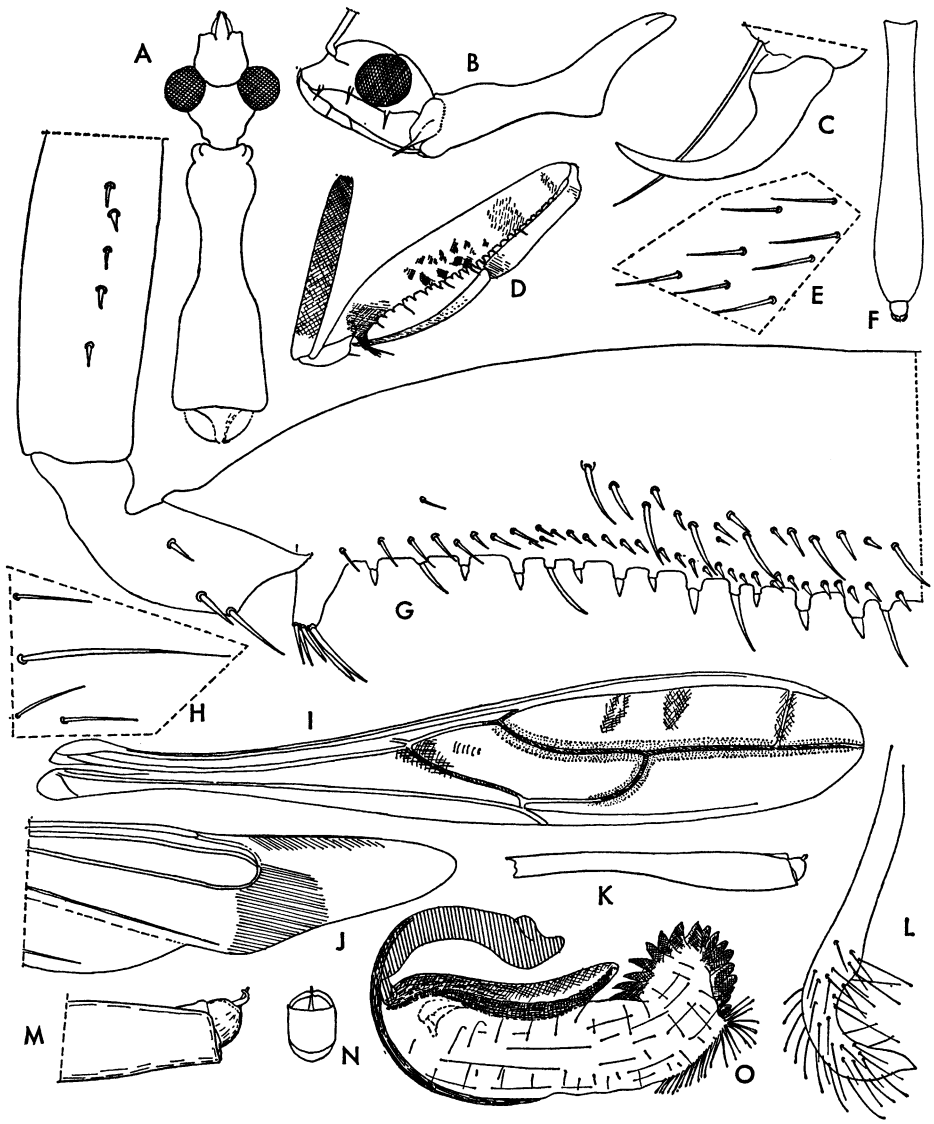


FIG. 41. *Orthunga motute*, macropterous male. A. Head and thorax, dorsal view. B. Head and prothorax, lateral aspect. C. Praetarsus and claw of hind leg. D. Foreleg, with color pattern. E. Setae of posterior femur. F. Abdomen, ventral view. G. Apex of coxa, trochanter, and base of femur of foreleg. H. Setae of pygophore. I. Forewing, with color pattern. J. Apical half of hind wing. K. Abdomen, lateral view. L. Paramere. M. Apex of abdomen, side view. N. Pygophore, with parameres, seen from behind. O. Phallus, lateral view.

Tubercles of center of abdominal tergites large (as shown in fig. 42D); ninth tergite not longer than wide at apex . *guineensis*

Orthunga dubia and *gravida* could not be placed in the key.

Orthunga arborea Bergroth

Orthunga arborea BERGROTH, 1906b, p. 268.

DISTRIBUTION: Comoro Islands.

TYPE: Unknown.

Orthunga delattrei Villiers

Orthunga delattrei VILLIERS, 1951, p. 333, fig. 4.

DISTRIBUTION: Ivory Coast.

TYPE: Male, Institut Français d'Afrique Noire.

Orthunga dubia Villiers

Orthunga dubia VILLIERS, 1950, p. 107.

The description of this species, based on an apterous female, is short and not accompanied by figures; it could thus not be included safely in the above key. A specimen from Dundo, Angola, is tentatively identified as *dubia*, and its abdomen is figured here to illustrate one of the various abdominal shapes found in the females of the genus (fig. 42D, E).

DISTRIBUTION: Angola.

TYPE: Female, Museo do Dundo.

Orthunga feai Villiers

Orthunga feai VILLIERS, 1948, p. 458, figs. 897–899, 902.

DISTRIBUTION: Principe Island.

TYPE: Male, Muséum National d'Histoire Naturelle.

Orthunga gravida Miller

Orthunga gravida MILLER, 1950, p. 194, figs. 6a–6c.

This species could not be placed in the above key; its description should, however, permit its identification.

DISTRIBUTION: Rhodesia.

TYPE: Female, British Museum (Natural History).

Orthunga guineensis Villiers

Orthunga guineensis VILLIERS, 1948, p. 456, figs. 821, 890–896.

DISTRIBUTION: Guinea.

TYPE: Male, Muséum National d'Histoire Naturelle.

Orthunga lineata Villiers

Orthunga lineata VILLIERS, 1949a, p. 252, fig. 219.

DISTRIBUTION: Mozambique; Congo (Léopoldville).

TYPE: Male, Muséum National d'Histoire Naturelle.

Orthunga motute, new species

Figures 41A–O; 42A, C, G–J

DESCRIPTION: Macropterous male: Length to apex of forewings, 9 mm.

Dorsal surface of head and thorax stramineous, faintly clouded with fuscous; disc of pronotum almost uniformly stramineous; lateral and ventral surfaces of head and pronotum fuscous to piceous. Abdomen fuscous to piceous, dorsal surface clouded with stramineous, connexivum with alternate stramineous and fuscous portions. First segment of antennae ochraceous, subbasally with a fuscous annulus, also darkened distally, apex with a conspicuous, whitish annulus; remaining segments ochraceous to fuscous, second segment with a narrow apical whitish annulus. Rostrum ochraceous, apical portion of first and second segments whitish. Forelegs (fig. 41D) with coxa ochraceous, fuscous toward base, apex flavous. Remaining segments ochraceous; subbasal region of femur, including entire penicillate process, fuscous, central region darkened with several roundish darker spots, two faint subapical annuli also dark; tibia darkened subbasally and at apex; tarsus faintly darkened on apical half. Mid and hind legs with coxa fuscous, remaining segments ochraceous, femora broadly darkened subapically and tibiae narrowly subbasally; apex of femora and base of tibiae broadly white. Forewings stramineous, veins of apical half of wing darkened and margined with dark, a few transverse clouded dark spots as shown in figure 41I.

Head and rostrum as shown in figure 41A, B; postocular portion with sides strongly convergent in dorsal view, posterior angles distinct before neck. Eyes very large, their distance dorsally slightly less than their width, their outline subcircular in lateral view, attaining level of ventral, and almost that of dorsal, surface of head. Three pairs of spiniferous tubercles, the second situated slightly but distinctly before level of anterior border of eyes. Antennae glabrous; length of first segment, 8 mm.

Shape of pronotum as shown in figure 41A, B; anterior portion somewhat swollen. Surface of pronotum subshining, fore lobe and intermediate portion microscopically reticulate, hind lobe delicately rugose transversely. Upper portion of anterior acetabula elongate, spinelike.

Shape and structure of forelegs as shown in figure 41D, G. Coxa as long as hind lobe of pronotum, inner surface apically with about five linearly arranged, short spines. Trochanter salient below, with one strong spinelike seta inserted on projection, and two

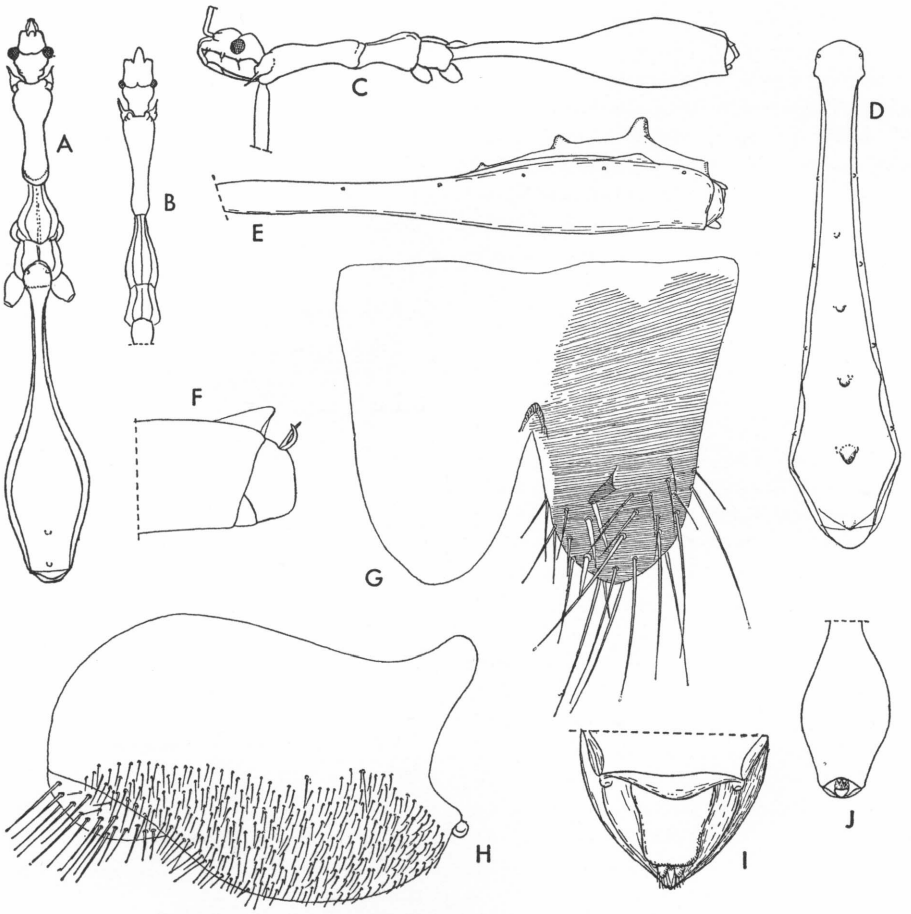


FIG. 42. A. *Orthunga motute*, female, general aspect, dorsal view. B. *Orthunga testacea*, apterous male, head and thorax, dorsal view. C. *Orthunga motute*, female, general aspect, lateral view. D, E. *Orthunga ?dubia*, apterous female. D. Abdomen, dorsal view. E. Abdomen, lateral view. F. *Orthunga testacea*, apterous male, apex of abdomen, lateral aspect. G–J. *Orthunga motute*, female. G. Syngonapophysis. H. Gonocoxites with gonapophysis. I. Genital region, seen from behind. J. Abdomen, ventral aspect. (B and F adapted from Villiers, 1949a.)

smaller ones situated at some distance below. Femur about six times as long as maximum width. Posteroventral series composed of basal penicillate process, seven long spinelike setae, about 10 medium-sized, and a few very short spines. Anteroventral series consisting of about 12 long and numerous short, spiniform setae. Accessory series composed of numerous short to very short spinelike setae.

Shape and proportion of tibia and tarsus as illustrated; their chaetotaxy and the structure of fore claw as in *wahlbergi* (see fig. 40E). Mid and hind legs slender. Posterior femora surpassing apex of forewings by 5 mm.; setae of femora uniform in size (fig. 41E). Tarsi like those of *wahlbergi* (see fig. 40M); claws as shown in figure 41C.

Forewings surpassing apex of abdomen by about 0.5 mm.; their venation as illustrated in figure 41I; portion of Cu situated basad of Pcu cross vein about as long as apical one; cross vein connecting anterior basal angle of discal cell to submarginal vein, incomplete, emitted slightly apicad of insertion of Cu. Hind wing as shown in figure 41J.

Abdomen slender, rather conspicuously

narrowed toward base in lateral view (fig. 41K). Eighth sternite very small (fig. 41M). Pygophore shorter than high in lateral view, subsemicircular; process slender, spiniform, surpassing apex of parameres above (fig. 41N); latter strongly curved apically, their shape and chaetotaxy as shown in figure 41L. Phallus (fig. 41 O) much like that of *wahlbergi* but smaller, and basal plates much more weakly sclerotized.

Apterous female: Length, 9 mm. General characters like those of male.

Head as shown in figure 42A, C. Eyes small, their distance dorsally equal to twice their width; subcircular in lateral view, remote from level of dorsal and ventral surface of head. Length of first segment of antennae, 7 mm.; relative length of segments, 1/0.8/-0.22/0.2. Pronotum as shown in figure 42A, C, rather conspicuously swollen anteriorly, convex above, with an extremely faint, median, longitudinal impression; hind border rounded, somewhat depressed. Mesonotum one-half as long as pronotum, with a distinct, median, longitudinal sulcus, disc strongly elevated behind, posterior border slightly salient in middle; proportions of mesonotum as shown in figure 42A. Metanotum half as long as mesonotum, as long as wide, with a conspicuous, median, longitudinal carina.

Abdomen (fig. 42A, C) pedunculate, very slender at base, strongly widened on apical half. Connexival margins entire, forming continuous outline. Dorsal surface slightly convex, limits between segments not distinct, dorsum with two centrally placed, low tubercles behind. Genitalia as given in generic description and shown in figure 42G–J; ninth tergite slightly longer than wide at apex.

MATERIAL EXAMINED: Cameroon: Motute, Tiko Pl. [Plantation?], May 1, 1949 (Malkin; the California Academy of Sciences), one male holotype, one female allotype; (Malkin; the American Museum of Natural History), one incomplete apterous specimen.

OBSERVATIONS: This species agrees with *guineensis* in the position of the second pair of setiferous tubercles of the under surface of the head; also the females seem similar. The pattern of the forewings (fig. 41I) is quite different from that of the species near the type of the genus, *wahlbergi* (see fig. 40J), in that it lacks the reticulate, veinlet-like pattern in the apical spaces. Another very conspicuous difference between the species near *wahlbergi* and *motute* is the kind of setae found on the mid and hind femora: of uniform size in *motute*, scattered long and numerous very short ones in *wahlbergi*.

Orthunga octospinata Villiers

Orthunga octospinata VILLIERS, 1949a, p. 355.

DISTRIBUTION: Madagascar.

TYPE: Female, Muséum National d'Histoire Naturelle.

Orthunga ogoouensis Villiers

Orthunga ogoouensis VILLIERS, 1948, p. 458, figs. 900, 901.

DISTRIBUTION: Bas Ogooué; Congo (Léopoldville).

TYPE: Female, Muséum National d'Histoire Naturelle.

Orthunga overlaeti Villiers

Orthunga overlaeti VILLIERS, 1949a, p. 351, fig. 218.

MATERIAL EXAMINED: [Former] Belgian Congo: Elisabethville, 1933 [Ch. Seydel; British Museum (Natural History)], one male.

DISTRIBUTION: Congo (Léopoldville); Angola; Tanganyika.

TYPE: Male, Musée Royal de l'Afrique Centrale.

Orthunga sicardi Villiers

Orthunga sicardi VILLIERS, 1949a, p. 353, figs. 228–231.

DISTRIBUTION: Madagascar.

TYPE: Male, Muséum National d'Histoire Naturelle.

Orthunga testacea Villiers

Figure 42B, F

Orthunga testacea VILLIERS, 1949a, p. 353, figs. 323–235.

Two of Villiers' figures are reproduced here to show characteristic features of the species.

DISTRIBUTION: Madagascar.

TYPE: Male, Muséum National d'Histoire Naturelle.

Orthunga uelensis Villiers

Orthunga uelensis VILLIERS, 1948, p. 457.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Male, Musée Royal de l'Afrique Centrale.

Orthunga wahlbergi (Stål)

Figures 2G; 3K; 5E; 40A–U

Emesa wahlbergi STÅL, 1855, p. 45.

Iccius wahlbergi: DOHRN, 1859, p. 52.

Orthunga wahlbergi: DOHRN, 1860, p. 250, figs. 21, 29.

Most of the figures of the male of this species, type of the genus, are taken from the detailed redescription given by Wygodzinsky (1958a); the phallus (figs. 40 O, Q, S) is shown here in more detail than previously. The spines of the under surface of the fore tarsus are arranged in a double row, not a single series as erroneously stated by Wygodzinsky (*loc. cit.*).

DISTRIBUTION: "Caffraria"; Transvaal.

TYPE: Naturhistoriska Riksmuseet.

PHRYXOBOTRYS McATEE AND MALLOCH

Phryxobotrys McATEE AND MALLOCH, 1926, p. 146.

DESCRIPTION: Macropterous or apterous. Small species (6–6.5 mm.).

Body surface glabrous, polished. General color dark, forewings with conspicuous pattern.

Macropterous male: Head fusiform, convex above, postocular region semiglobular; anteocular portion of head slightly longer than postocular. Interocular furrow strongly backwardly curved, extending slightly beyond level of posterior border of eyes. Eyes medium sized. Rostrum very slender, straight; first segment reaching level of anterior border of eyes; second slightly shorter than first, attaining level of posterior border of eyes; third slightly longer than first. Antennae inserted somewhat before center of anteocular portion of head. Pronotum not covering mesonotum, subcylindrical, fore lobe narrowed posteriorly, hind lobe very short; mesonotum highly convex, with 1+1 conspicuous lateral carinae. Scutellum and metanotum lacking processes. Posterior border of prosternum emarginated at center.

Forelegs moderately slender. Coxa very elongate, five-sixths as long as femur, bare. Trochanter with simple setae only. Femur slightly wider at base than at middle; spines arranged in two series, beginning at center of segment. Posteroventral series complete, consisting of strong, spinelike setae inserted on very short bases, second spine from base much longer than any of remaining, latter varied in size. Anteroventral series composed of one large spine situated at level of basal third of posteroventral series, followed by a series of very slender long setae; not interrupted at base. Tibia very short, one-fourth as long as femur, stout, lacking spiniform setae; hairs of ventral surface elongate. Tarsus three-fourths as long as tibia, slender, rather strongly sclerotized, almost bare at sides and above, ventrally at base with short slender setae, transformed apically into short, deflexed, not strongly pigmented spines. Tibia, tarsus, and claws combined half as long as femur. Two claws; outer one very large, one-third as long as tarsus, slender, simple in structure; inner one very much reduced in size, its structure simple. Mid and hind legs very long and slender, posterior femora distinctly surpassing apex of abdomen. Femora with short setae of uniform type. First and second segments of mid and hind tarsi subequal in length, third slightly longer; setae simple. Claws moderately curved, lacking ventral lamella.

Forewings rather wide apically. Venation as usual for the tribe; anterior and posterior basal angle of discal cell each connected by a cross vein to submarginal vein. Apex of pterostigma falling considerably short of wing tip. Hind wing with hamus meeting Sc+R at a short distance from level of cross vein, running parallel to it for most of its extension. M-cu cross vein slightly rounded; section of M connecting m-cu to R+M very short. Cu not extending beyond cross vein; R+M rather faintly extending from level of cross vein to wing tip, accompanied by extension of transverse thickening, which also sends off a branch toward apex of 1A.

Abdomen moderately narrowed at base, widened toward middle and narrowed again at apex, in dorsal view. Sternites with short setae of virtually uniform size.

Genitalia as usual for the tribe. Posterior margin of pygophore virtually straight across. Phallosoma subcylindrical, rather uniformly

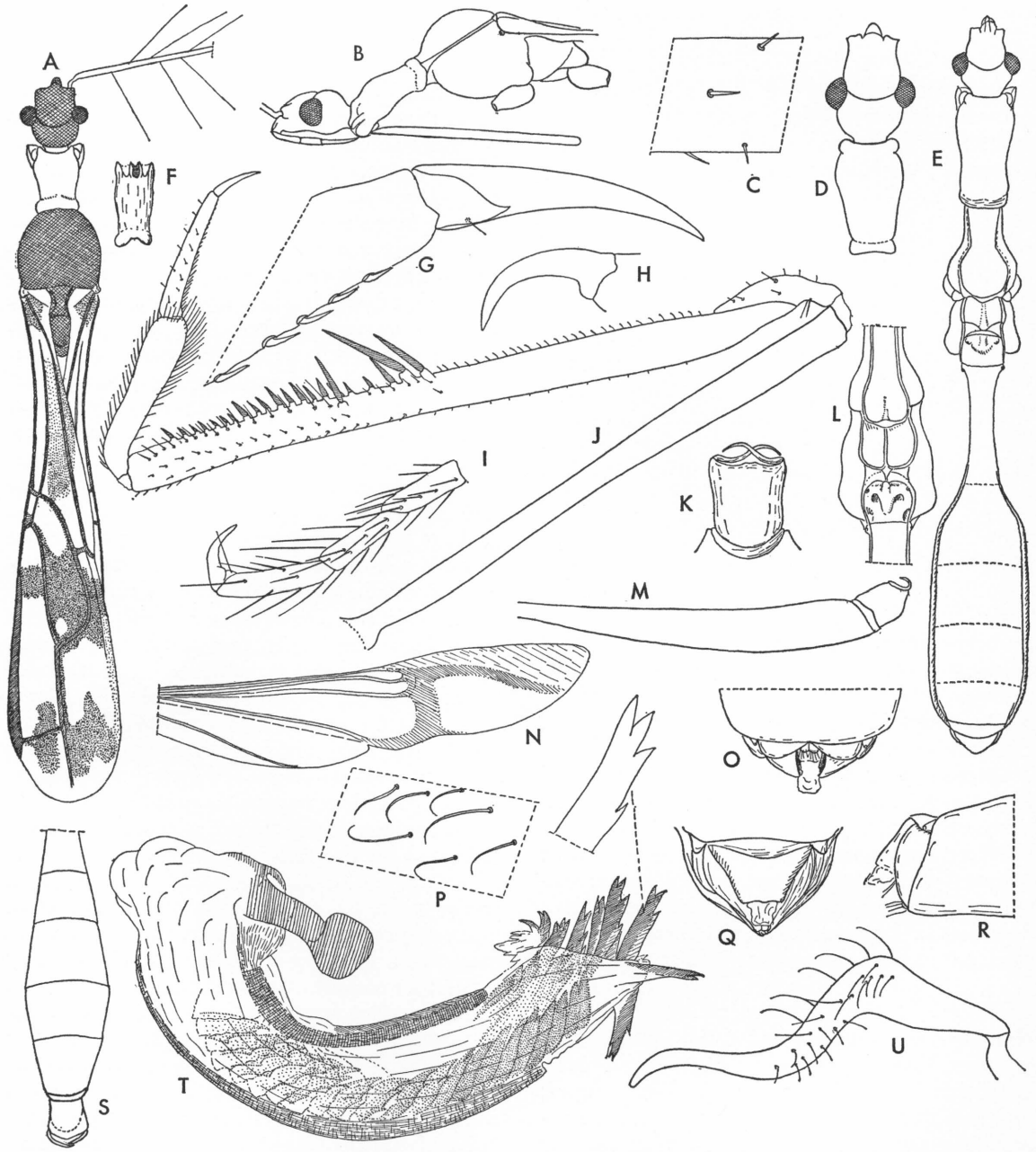


FIG. 43. A–C. *Phryxobotrys ridicula*, male. A. General aspect, with color pattern. B. Anterior portion of body, lateral view. C. Portion of posterior femur. D. *Phryxobotrys castanea*, female, head and pronotum, dorsal view. E–K. *Phryxobotrys ridicula*. E. Female, general aspect. F. Prothorax of male, seen from below. G. Apical portion of fore tarsus, with claws. H. Claw of hind leg. I. Posterior tarsus. J. Foreleg. K. Pygophore, inferoposterior view. L. *Phryxobotrys castanea*, female, mesothorax, metathorax, and base of abdomen, dorsal aspect. M–U. *Phryxobotrys ridicula*. M. Abdomen of male, lateral view. N. Hind wing. O. Genital region of female, as seen from below. P. Setae of pygophore. Q. Genital region of female, seen from behind. R. Apex of abdomen of female, lateral aspect. S. Abdomen of male, seen from below. T. Phallus, lateral view, spine of endosoma shown with high magnification. U. Paramere.

though weakly chitinized ventrally; dorsal chitinization on apical half of phallosoma, subelliptical. Struts completely fused, resulting sclerite narrow, parallel-sided. Sclerotized projections of endosoma with several points apically and subapically. Parameres very elongate, slender, S-curved (generic character?).

Apterous female: General characters like those of male. Interocular furrow not attaining level of posterior border of eyes. Pronotum subcylindrical, slightly narrowed posteriorly, faintly constricted before hind lobe, latter very short, collar-like. Mesonotum very slightly shorter than pronotum, limited on each side by a distinct carina, widened posteriorly. Metanotum half as long as mesonotum, slightly wider than long, with 1+1 lateral and one percurrent median carina. Abdomen clavate; basal portion subcylindrical, abruptly widened on third or fourth segment, narrowing very little posteriorly. Eighth tergite very short, semi-elliptical; ninth tergite obliquely inclined posteriorly, subtriangular, rounded or truncate apically.

TYPE SPECIES: *Phryxobotrys castanea* McAtee and Malloch (monobasic).

DISTRIBUTION: Oriental Region.

OBSERVATIONS: This peculiar genus had tentatively been placed by its authors near *Ghilianella* (Metapterini), perhaps owing to the fact that only the apterous female was known to them. The macropterous male, herein described for the first time, leaves no doubt as to the position of *Phryxobotrys* in the Leistarchini.

KEY TO THE SPECIES OF *Phryxobotrys*

Head and thorax piceous; abdomen piceous, connexival segments each with a testaceous spot; legs light brown, mid and hind femora yellowish at apex, a subapical annulus dark brown . . . . . *castanea*

Head, mesothorax, and metathorax castaneous to piceous; pronotum lighter colored; abdomen without light-colored spots on connexivum; mid and hind femora virtually concolorous . . . . . *ridicula*

Phryxobotrys castanea McAtee and Malloch

Figure 43D, L

Phryxobotrys castanea MCATEE AND MALLOCH, 1925, p. 147, fig. 55.

The accompanying figures show the structure of the head and thorax of this species, known from the apterous female only.

DISTRIBUTION: Philippines.

TYPE: Female, United States National Museum.

Phryxobotrys ridicula, new species

Figure 43A–C, E–K, M–U

DESCRIPTION: Macropterous male: Length to apex of forewings, 6.5 mm.

Head, mesonotum, and metanotum castaneous; pronotum, abdomen, antennae, and legs ferruginous; apex of fore femur as well as entire tibia and tarsus castaneous. Forewings nacreous, with velvet-like castaneous blotches as shown in figure 43A. Surface of head and thorax highly polished; abdomen shining, microscopically rugose. Surface of body glabrous or with very sparse short pile only.

Shape of head and rostrum as given in generic description and shown in figure 43A, B. Distance between eyes dorsally slightly more then twice their width; oval in lateral view, not attaining level of dorsal or ventral surface of head. First and second segments of antennae with relatively sparse, extremely long hairs, their length up to one and one-half times that of head. First segment, 4.5 mm.; relative length of segments, 1/0.8/0.29/?.

Thorax as given in generic description and shown in figure 43A, B, F.

Forelegs as given in generic description and shown in figure 43G, J. Coxa slightly longer than head and thorax combined. Mid and hind legs with very short, inconspicuous setae only (fig. 43C); hind femora surpassing apex of forewings by 2 mm. Tarsus and claws as shown in figure 43H, I.

Fore and hind wings as given in generic description and shown in figure 43A, N; forewing surpassing apex of abdomen by 0.8 mm.

Abdomen as given in generic description and shown in figure 43A, M, S. Pygophore as shown in figure 43K, M, P, S. Parameres as shown in figure 43K, U, almost as long as width of pygophore. Phallus as given in generic description and shown in figure 43T.

Apterous female: Length, 6.5 mm.

Head, mesothorax, and metathorax piceous; rostrum, antennae, pronotum, legs, and abdomen ferruginous; fore femora somewhat

darkened at base; petiole of abdomen yellowish, dorsal surface of widened portion of abdomen clouded with dark.

Surface of head, thorax, and legs highly polished; abdomen shining, microscopically rugose transversely.

General morphological characters like those of macropterous male. Eyes slightly smaller; sides of postocular portion of head straight, converging posteriorly in dorsal view. Shape and relative dimensions of segments of thorax and shape of abdomen as shown in figure 43E; of genital region, in figure 43E, O, Q, R.

MATERIAL EXAMINED: *Sumatra*: Suban Alam, July, 1916 (Edw. Jacobson; Zoölogisch Museum), one male holotype. *Borneo:* British North Borneo, West Coast Residency, Ranau, September 28 to October 7, 1958 (T. C. Maa; Bernice P. Bishop Museum), one female.

OBSERVATIONS: Differences in color and the shape of the prothorax indicate specific difference between the female described above and that of *castanea*. Color characters have also been used for the correlating of the male from Sumatra with the female that is described herein.

PLOIARIA SCOPOLI

Ploiaria SCOPOLI, 1786 (1786–1788, vol. 1), p. 60.
Cerascopus HEINEKEN, 1830, p. 36.
Emesodema SPINOLA, 1840, p. 87.
Luteva DOHRN, 1860, p. 242.
Ploiariopsis CHAMPION, 1898a, p. 173.
Elymas DISTANT, 1909, p. 504 (new synonymy).
Culicimimus VILLIERS, 1948, p. 446 (new synonymy).

DESCRIPTION: Macropterous, brachypterous, micropterous, or apterous. Small to large-sized species (4–20 mm.).

Body surface dull to shining, from smooth to slightly granulated. Color from uniform to conspicuously marked.

Macropterous form: Head of varied shape. Relation of anteocular to postocular region variable; under surface lacking spines. Position of interocular furrow varied, but in no case surpassing level of posterior border of eyes. Eyes medium sized to large. Rostrum slender, not or only very slightly bent between first and second segments, latter slightly longer than, or as long as, first, not surpassing level of posterior border of eyes; all segments virtually parallel-sided. Antennae generally inserted somewhat before middle of anteocular region.

Pronotum not covering mesonotum; fore lobe from globular to cylindrical, in some cases constricted on posterior half, but in none pedunculate. Hind lobe from being hardly discernible to being distinct, but in no case covering more than extreme base of mesonotum. Mesonotum from slightly to distinctly longer than wide, with a median longitudinal depression. Scutellum and metanotum lacking processes or spines. Upper portion of anterior acetabula in no case conspicuously projecting. Posterior border of prosternum emarginated.

Forelegs stout to slender. Coxa lacking spines. Trochanter glabrous, or with simple hairs, or with one to several spinelike setae or spines frequently inserted on a conspicuous ventral projection. Femur with two series of spinelike setae or spines, subequal or of conspicuously different sizes, inserted on small or large basal tubercles. Both series beginning at or near base of segment, anteroventral series either interrupted at base or not, in latter case beginning considerably distad of base of femur. Fore tibia about half as long as femur, its under surface with one or two rows of variously shaped, spinelike setae, spines, or denticles. Fore tarsus heavily sclerotized, virtually bare above and at sides, its length from one-half to four-fifths of that of tibia. Tarsus three-segmented, the basal segment long, second shorter than, rarely as long or almost as long as, first, third shortest. Under surface of tarsus with one or two rows of variously shaped spines or denticles. Two claws of subequal or distinctly different sizes, rarely only one claw. Mid and hind legs simple, posterior femur surpassing apex of abdomen or forewings. Femora and tibiae with simple or modified setae of one size, or with microchaetae and macrochaetae, latter relatively short. Tarsal segments subequal in length, in some cases second distinctly shorter than first or third, setae simple, sparse or dense, especially on under surface, in some cases those of ventral surface of third segment thickened apically, forming a more or less compact scopula. Claws slender, simple, or, rarely, with a rounded or pointed submedian process.

Forewings with venation as usual for the

tribe; anterior and posterior basal angles of discal cell each connected to submarginal vein by a cross vein. Apex of pterostigma carried almost to wing tip. Surface of forewing smooth or microscopically reticulate. Hind wings with hamus approaching Sc+R abruptly or gradually, running parallel to latter for a large extension. M-cu rather strongly curved, short; section of M connecting m-cu to R+M short, its position varied. Cu extending beyond cross vein or not; if extending, then rather short, directed toward posterior border of wing. R+M simple, extending from level of cross vein to apex of wing. Transverse thickening well developed.

Abdomen from relatively stout to very slender; segmental limits not invariably distinct. Connexival margins entire, forming continuous outline, rarely slightly undulate. Setae of sternites and tergites either of uniform size or divided into microchaetae and macrochaetae.

Male: Seventh tergite short, only slightly salient at middle. Eighth sternite either entirely visible, forming a continuation of totally exposed eighth tergite, or partly covered by seventh sternite; latter case, eighth tergite invisible. Pygophore of varied shapes and relative sizes, its dorsal surface completely sclerotized. Posterior border of pygophore entire, emarginated or with a process which may arise from inferior or superior margin. Shape of process varied: from broadly triangular to narrowly pointed, or from apically truncate to slightly emarginated or deeply incised. Parameres from band-shaped or rodlike to slightly or distinctly bent or variously curved; their position and direction varying. Phallus symmetrical to asymmetrical. Basal plates medium sized; struts situated at dorsal surface of phallotheca, separated on basal third, fused on apical two-thirds, in some cases asymmetrical. Phallotheca wide or narrow, membranous, generally with dorsal and ventral, band-shaped sclerotizations, in some cases also lateral wall of phallotheca sclerotized to a varied degree. Endosoma with a varying number of rows of toothlike projections of varied size, projections smooth or serrulated on one or both sides, forming symmetrically or asymmetrically arranged groups.

Female: Abdomen frequently wider than that of male. Eighth and ninth tergites well developed, subhorizontal, eighth generally larger than ninth. Gonocoxites often covered to a considerable degree by seventh sternite; if so, setae of gonocoxites limited to narrow exposed margin. Gonapophyses well developed. Syngonapophysis large and salient, very conspicuous when *in situ*, heavily sclerotized, its posterior border more or less deeply emarginated or incised.

Micropterous and apterous forms: General characters like those of macropterous form. Pronotum from subglobular to subcylindrical, longer than wide, its hind lobe from poorly to well developed, covering only extreme base of mesonotum. Mesonotum longer than wide, but invariably shorter than pronotum; metanotum from subquadrangular to about twice as long as wide, but invariably shorter than mesonotum, both combined about as long as pronotum. Mesonotum and metanotum carinate or sulcate partly or completely dorsally along their middle.

TYPE SPECIES: Of *Ploiaria*, *Ploiaria domestica* Scopoli (monobasic). Of *Cerascopus*, *Ploiaria domestica* Scopoli (as *Cerascopus marginatus*) (monobasic). Of *Emesodema*, *Ploiaria domestica* Scopoli (monobasic). Of *Luteva*, *Luteva concolor* Dohrn (by subsequent designation, Van Duzee, 1916). Of *Ploiariopsis*, *Ploiariopsis megalops* Champion (by subsequent designation, Van Duzee, 1916). Of *Elymas*, *Elymas praesentans* Distant (monobasic). Of *Culicimimus*, *Culicimimus gabonensis* Villiers (monobasic).

DISTRIBUTION: All zoogeographical regions.

OBSERVATIONS: As understood herein, *Ploiaria* contains a large number of species, some very dissimilar in general aspect and in important structural characters. However, I agree with McAtee and Malloch (1925): "That we have here a group of closely allied species well regarded as belonging to a single genus is evident from the intergradation observable in what have been considered diagnostic characters." This intergradation can be appreciated through a careful examination of the illustrations contained in this paper. One example may suffice to stress my point:

There is a group of species of *Ploiaria* centering around New Guinea, characterized by distinctive bends in both veins bordering the

discal cell (as in fig. 54 O), the simple subequal setae of the under side of the fore femur (fig. 55A), the presence of a scopula on the third tarsal segment of mid and hind legs (figs. 54V; 55I), a conspicuous process on the under surface of the claws of mid and hind tarsi (figs. 54N; 55H), the transverse overlapping parameres of the male (fig. 55M), and the asymmetrical endosoma of the phallus (fig. 55Q). *Ploiaria maai* (fig. 55A–Q, S, V, W, Z, AA) agrees well with the above generalized description, but the outer vein limiting the discal cell lacks a bend (fig. 55F). *Ploiaria circe* belongs here as shown by the structure of the external male genitalia (fig. 55T, X, Y), the asymmetrical endosoma of the phallus, and the well-developed scopula of the third tarsal segment, but the claws are simple, and the veins limiting the discal cell lack any bend. *Ploiaria ultima* possesses a scopula, its claws are modified as described above, and the endosoma is asymmetrical; however, the apex of the pygophore (fig. 47 O) is completely different from that found most frequently in the group. The apterous *P. glabella* belongs to the present group, as shown by the genitalia of the male (fig. 52N), but the claws of mid and hind legs are simple, and the scopula of the third tarsal segment is substituted by a dense brush of simple setae on the first tarsal segment (fig. 52F). A scopula is present in *P. biroi*, though its component setae are few in number (fig. 54V); the claws of the mid and hind legs each possess a conspicuous ventral process (fig. 54V); one of the veins limiting the discal cell is strongly bent (fig. 54T); but the very elongate spiniferous processes of the fore femur and the peculiar armature of the fore tibia and tarsus (fig. 54R, W) and especially the completely different structure of the pygophore (fig. 54U, AA) seem to remove *biroi* from the immediate neighborhood of the central New Guinea group. Another modification of the important leg structure is found in *P. jimmiwum*, known from a female only. Both veins limiting the discal cells are strongly bent (fig. 54 O); the scopula of the third tarsal segment is well developed, but the processes of the mid and hind claws are relatively small (fig. 54N); the setae of the series of the fore femur are stouter and much longer than usual (fig. 54D); and the spines of the under side of the fore tibia are short and beak-shaped (fig. 54H), a condition not found elsewhere in this genus.

The combination of characters described at the beginning of the last paragraph seems peculiar enough to warrant the creation of an independent higher unit, if no annectant forms were known. However, the latter is the case, and at this time no precise limits for the hypothetical separate group can be advanced. It may be mentioned here that a scopula is also found in certain West Indian *Ploiaria*, such as *P. maria*, but these insects differ from the Pacific species by the symmetrical endosoma of the male.

Similar transitions are found in other groups that have been accorded generic rank by different authors and that are here included in *Ploiaria*. It is not intended to imply that a rational division of the actual genus *Ploiaria* is impossible. A detailed morphological analysis of a large number of the named species and the discovery of significant additional ones may well lead toward a more meaningful arrangement. At this time it is felt that inclusion of all the species enumerated below in a single confessedly polymorphic genus is less misleading than an uncritical splitting off of certain species groups not separated by a definite gap from other such groups making up the bulk of the genus.

A short discussion of the generic synonymy may be helpful.

The type of *Cerascopus* Heineken and *Emesodema* Spinola is the same as that of *Ploiaria* Scopoli, hence the synonymy.

The type species of *Luteva* (*concolor*) belongs to a group of slender, pale, generally fully winged Pacific species which lack spines on the trochanter and the femoral spinelike setae of which, inserted on very low, wartlike bases, are short and subequal in size, such as in *nitida* or *halosydne* (fig. 47R); the structure of the male genitalia is quite varied in this group. Unless new evidence becomes available, the distinguishing character of *Luteva* is the structure of the foreleg, but it has been stressed already by McAtee and Malloch (1925) that such species as *setulifera* (fig. 46C), the foreleg of which agrees with that of typical *Luteva* with the exception of the presence of a spiniform seta also on the trochanter, are intermediate in this respect between *Luteva* and species with more complex fore-

legs. The same is true for *darlingtoni* (fig. 46G) and others. The spiniform setae of the fore femur remain short and subequal in such species as *regina* (fig. 47M), *capeneri* (fig. 48 D, G), and *carvalhoi* (fig. 49C, H), but in them the now very conspicuous spinelike setae of the fore trochanter are inserted on distinct projections. Inversely, we can also find a combination of extremely well-developed femoral spines with a completely glabrous trochanter, as in *guttata* (fig. 45D). This discussion shows that on the basis of our present knowledge no precise limits can be found for *Luteva* and that it cannot now be maintained as a valid genus.

The type species of *Ploiariopsis* (*megalops*), belonging to a group centering on the Sonoran subregion in North America, is characterized by an extraordinary development of the spines of the trochanter and femur of the forelegs (fig. 46A, E, I, L), more or less conspicuous modifications of the head shape (fig. 46A, E, I, L), and often granular body surface. The inner claw of the foreleg is strongly reduced in size; the phallus (in the only species now examined for this character) is very similar to that of *macrophthalma* (see fig. 56N); and the projection of the pygophore is very short. This group is clearly distinct from that around *domestica*, the type species of *Ploiaria*, but until the characters of more species have been examined and evaluated, it seems unwarranted to maintain *Ploiariopsis* as a valid genus.

Elymas praesentans, the type of *Elymas*, has been examined by R. L. Usinger (personal communication). It is now obvious that *praesentans* belongs to the group of Pacific *Ploiaria*, discussed above, with glabrous trochanter, short, subequal, spinelike setae on the fore femur, and curved overlapping parameres. If this group should ultimately be given formal status, the name *Elymas* would be available for it. At the present time, *Elymas* is listed as a synonym of *Ploiaria*, and, for practical reasons, the assemblage discussed is designated the "Elymas" group.

Culicimimus is based on the Ethiopian *C. gabonensis*; three additional species closely related to the type were included by Villiers (1949a), one of which is *macrophthalma* (as *brinae*). This species, here illustrated in detail (fig. 56A–O), is closely related to the Sonoran species group mentioned above under *Ploiariopsis*, as shown by the general similarity of the structure of the forelegs, especially the extreme reduction of the inner claw, and the exact agreement of the structure of the specialized phallus (fig. 56N). The American *pilicornis*, belonging to this complex, is actually more nearly related to the Ethiopian species than to the American ones of the *Ploiariopsis* type. It is obvious that *Culicimimus* cannot be maintained. If future work should show it not to be congeneric with *Ploiaria*, as exemplified by *domestica*, the species listed under *Culicimimus* must be transferred to *Ploiariopsis*, but as long as the latter is not considered valid, the species described under *Culicimimus* are included in *Ploiaria*.

KEY TO NEW WORLD SPECIES OF *Ploiaria*

1. Fore trochanter either bare or with scarce to numerous delicate, short hairs (fig. 49T), in no case with outstanding bristles or spines; fore femur with spiniform setae of more or less uniform size inserted on short basal tubercles (fig. 49T) 2
   Fore trochanter with from one to several spinelike setae, which are generally stout, rarely slender or very slender, but invariably distinguishable from delicate hairs which may also be present (figs. 46A–C, E, G, I, L; 49C, H; 50B, C, O; 56D, P, T, X; 57C, D); fore femora as above, or with spines of conspicuously varied sizes, four or five outstanding ones inserted on large basal tubercles (figs. 46A, B, I, L; 50C, O) 12
2. Micropterous (fig. 49W) . . . . . *denieri*
   Fully winged 3
3. Eyes about three times as wide as interocular space dorsally (fig. 49U) 4
   Eyes not distinctly wider than dorsal interocular space (fig. 49R) 5
4. Fore femur with two dark rings; ventral surface of thorax yellowish . . . . *buscki*
   Fore femur with four dark rings; thorax dark brown ventrally . . . . . *geijskesi*
5. Discal cell with an elongate dark spot, which is almost black as if sclerotized . . . . . *rufoannulata*
   Discal cell different 6
6. Apical half of forewing with an elongate, uniformly dark band (fig. 49S) . . . *penai*
   Pattern of forewing different 7
7. Thorax and forelegs uniformly castaneous . . . . . *alexanderi*
   Thorax and forelegs pale yellowish, in some cases with faint pattern elements . . . 8

8. Pygophore of male with 1+1 dorsolateral processes (fig. 49Y) 9
Pygophore of male lacking dorsolateral processes 10
9. Dorsolateral processes of pygophore elongate, slender, as long as height of pygophore; posterior femora uniformly colored . . . . . *yunquensis*
Dorsolateral processes of pygophore much shorter, shorter than height of pygophore (fig. 49Y); posterior femora with dark preapical annulus . . . . . *maria*
10. Pygophore of male projected superoposteriorly into 1+1 stout processes which bear apically numerous, short, dark, spinelike setae (as in fig. 49X, Y) 11
Pygophore of male lacking said projections . . . . . *varipennis*
11. Marginal area of forewing before Rs cross vein with seven to eight circular spots; pygophore longer than wide in ventral aspect . . . . . *poncei*
Marginal area of forewing before cross vein with only five larger spots; pygophore of male not longer than wide in ventral view . . . . . *gundlachi*
12. Postocular region dorsally at center with a backwardly directed spine (fig. 46A) . .13
Spine mentioned absent 14
13. Last tergite of male with narrow, apically truncate, bandlike projection which extends posteriorly over pygophore; median process of seventh tergite of female surpassing posteriorly level of pointed, posterolateral angles of tergite . . *denticauda*
Projection of last tergite of male shorter, pointed; median projection of seventh tergite of female not quite surpassing level of rounded, posterolateral angles of tergite . . . . . *hirticornis*
14. Postocular portion of head immediately behind interocular furrow on each side with a small, forwardly inclined, slender spine above eye (fig. 46E) . . . . . *reticulata*
Postocular region of head different . . .15
15. Fore coxa shorter than tibia (fig. 50B); insect completely apterous (fig. 50A) 16
Fore coxa not shorter than tibia (figs. 46C, I, L; 49H; 56T; 57C); winged (figs. 49A; 56A; 57A), or micropterous (fig. 46H) 17
16. Long spiniferous processes of posteroventral series of fore femur forming a series situated distinctly laterad of line formed by short processes of same series (fig. 50B); four or five short, between long, processes; mid and hind femora dark, with a narrow, white, apical annulus . . . . . *chilensis*
Long spiniferous processes of posteroventral series of fore femur forming a series almost imperceptibly laterad of line formed by short processes of same series; only two or three short, between long, processes; mid and hind femora dark, each with an apical and subapical whitish annulus . . . *aptera*
17. Large spines of fore femora, combined with their bases, much longer than diameter of segment (fig. 46I, L); anteocular portion of head dorsally with 1+1 elevations bordering a deep sulcus before interocular furrow; postocular portion of head with a more or less developed median longitudinal ridge or carina dorsally 18
Spines of fore femur, combined with their bases, in no case exceeding length of diameter of segment (figs. 46C; 49H; 56D, T; 57D); anteocular portion of head lacking dorsal sulcus, or, if present, weakly developed; postocular region lacking ridge or carina dorsally 21
18. Only delicate bristles between large spiniferous processes of posteroventral series of fore femur (fig. 46L) . . . . . *uniseriata*
Distinct, short, spiniferous processes interspersed between large processes of posteroventral series of fore femur (fig. 46I) . .19
19. Size, under 5 mm.; fore coxa not or hardly longer than fore tibia; mid and hind femora with a conspicuous, narrow, fuscous, subapical annulus and a broader, apical one (fig. 46D); pronotum not much longer than wide, its fore lobe subglobular . . . . . *granulata*
Size, more than 5 mm.; fore coxa distinctly longer than tibia; mid and hind femora differently colored, pronotum subcylindrical, twice or almost twice as long as maximum width 20
20. Parameres of male almost as long as pygophore; size of insect, 6 mm. . . *punctipes*
Parameres of male much shorter than pygophore (fig. 46J); size of insect, 8 mm. . . . . *similis*
21. Micropterous (fig. 46H); dorsal interocular distance three times width of eye (fig. 46H) . . . . . *darlingtoni*
Fully winged; dorsal interocular distance less than three times width of eye 22
22. Interocular distance dorsally larger than width of eye 23
Interocular distance dorsally not larger than width of eye (figs. 49A; 56A, R; 57A) . .25
23. Trochanter lacking ventral projection, with a single outstanding bristle; spinelike setae of fore femur subequal in size, inserted on very short, basal tubercles (fig. 46C) . . . . .

. . . . . *setulifera*

Trochanter with distinctive ventral projection, bearing several strong, spinelike setae; fore femur with several outstanding strong spines inserted on large basal tubercles 24

24. Fore tarsus two-thirds as long as tibia; pronotum with slight, median, longitudinal depression; longest spines of fore femur, combined with their bases, as long as diameter of segment . . . . . *carolina*

Fore tarsus less than two-thirds as long as tibia; pronotum lacking median longitudinal depression; largest spines of fore femur, combined with their bases, not so long as diameter of femur . . *floridana*

25. Size, approximately 15 mm.; inferoposterior border of pygophore of male with a stout, horizontal, spinelike process (fig. 57M, N, R, S) . . . . . *plaumanni*

Size, less than 10 mm.; pygophore different 26

26. Fore trochanter with several distinct spinelike setae (figs. 49C; 56D, X) 28

Fore trochanter with one or two outstanding bristles which are not spinelike (similar to fig. 46C, G) 27

27. Pronotum twice as long as its maximum width; portion of M emitted from apex of discal cell undulated, cross vein situated near its middle; mid and hind femora each with two preapical pale annuli . .*brunnea*

Pronotum about one-third longer than its maximum width; vein emitted from apex of discal cell straight, cross vein situated nearer to base than to apex of M; mid and hind femora each with one pale annulus . . . . . *sicaria*

28. General color dark castaneous; fore femora with a pale submedian annulus (fig. 46B), mid and hind legs uniformly dark; forewings dark brown, lacking pattern elements . . . . . *bequaerti*

Coloring different 29

29. Color pattern of forewings forming a conspicuous coarse reticulation (fig. 49B); anteroventral series of fore femur not interrupted at base (fig. 49C); pygophore of male with an elongate, spinelike, upwardly directed projection posteriorly (fig. 49K, L): parameres S-shaped (fig. 49P). . *carvalhoi*

Color pattern of forewings very faint or imperceptible; anteroventral series of fore femur interrupted at base (fig. 56D) or not; process of pygophore and shape of parameres different 30

30. Discal cell of forewing wide, its length not more than three times its maximum width and approximately equal to four-fifths of length of longitudinal vein emitted from apex of cell (fig. 56A); process of pygophore bifid apically (fig. 56J) 31

Discal cell of forewing narrow, about five times as long as its maximum width, and slightly longer than vein emitted from its apex (fig. 56Q); process of pygophore not bifid (fig. 56CC) 33

31. Pronotum faintly sulcate longitudinally along center; process of pygophore of male slightly diverging, distance between their apices subequal to depth of space between them (fig. 56J) 32

Pronotum not sulcate above; processes of pygophore of male slightly converging, space between them much narrower than high . . . . . *pilicornis*

32. Forewings whitish, without perceptible pattern elements . . . . . *albipennis*

Forewings with distinct though faint pattern elements . . . . . *macrophthalma*

33. Length, 7 mm.; color brownish testaceous; dorsal interocular distance less than width of eye; discal cell of forewing at least five times as long as its maximum width . . . . . *umbrarum*

Length, 8 mm.; color stramineous; dorsal interocular distance greater than width of eye; discal cell of forewing distinctly less than five times as long as its maximum width . . . . . *maya*

Ploiaria californiensis, *fairmairei*, *megalops*, *praedator*, *sonoraensis*, and *texana* could not be included in this key.

KEY TO OLD WORLD SPECIES OF *Ploiaria*

1. Apterous or micropterous insects (figs. 44A; 47A, C, L, N, T; 48A; 50A; 51A; 52A; 53A, E) 2

Fully winged insects (figs. 45A, I; 54A, S; 55F; 56A) 30

2. Trochanter of forelegs with spiniform setae inserted on a distinctly elevated base (figs. 47B, D, G, I, J, M; 48D, G; 50C; 51B, C) 3

Fore trochanter without spiniform setae (figs. 52C; 53F) or, if present, latter very inconspicuous and not inserted on an elevated base (fig. 44D, G) 27

3. Thorax extremely elongate, about 10 times as long as wide (fig. 48A) . . . . . *capeneri*

Thorax much shorter 4

4. Projection of fore trochanter with three or four spiniform setae (fig. 47M); wing pads conspicuous, elongate, about seven times as wide (fig. 47L) . . . . . *regina*

Projection of fore trochanter normally with one spiniform seta only, rarely with two; wing pads very inconspicuous, not more than twice as long as wide, or completely absent (figs. 47A, C, F, N, T; 50A; 51A) 5

5. Under surface of head posteriorly with one median or 1+1 lateral protuberances (fig. 47E) 6
Under surface of head lacking protuberances 9

6. Under surface of head with 1+1 small, sublateral protuberances; postocular region flattened above in lateral view . . . . . *noualhieri*
Under surface of head with one large central protuberance behind; postocular region strongly convex above in lateral view (fig. 47E) 7

7. Size, 6 mm.; pronotum almost twice as long as maximum width in dorsal view; its length more than twice its height in lateral aspect . . . . . *soudanica*
Size, 5 mm. or less; pronotum hardly longer than wide in dorsal view (fig. 47F); its length not more than twice its height in lateral aspect (fig. 47E) 8

8. Length of insect, 5 mm.; prothorax half as high as long in lateral view; hind margin of pronotum simply emarginate; spines of fore femur combined with their bases distinctly shorter than diameter of article . . . . . *gutturalis*
Length of insect, less than 5 mm.; prothorax higher than half of its length in lateral aspect; hind margin of pronotum bisinuate; spines of fore femur combined with their bases about as long as diameter of femur (fig. 47I) . . . . . *mosconai*

9. Postocular region of head dorsally with one central tubercle behind interocular furrow, and 1+1 sublateral tubercles near its hind margin . . . . . *abrupta*
Structure of head different 10

10. Head, mesothorax and metathorax, and apical four-fifths of abdomen piceous, prothorax and base of abdomen yellowish, fore femur dark with exception of a submedian, light-colored annulus (fig. 47A); abdomen highly polished, segmental limits not distinct; fore tarsus four-fifths as long as fore tibia (fig. 47B) . . . . . *brincki*
Different combination of characters . . . 11

11. Pronotum as long as wide, fore lobe globular. 12
Pronotum longer than wide, fore lobe not globular 13

12. Spines of fore femora combined with their bases not longer than diameter of article; fore femora testaceous, their under surface and their apex brown . . . . *tuberculata*
Spines of fore femora combined with their bases longer than diameter of article; fore femora brownish, with one whitish annulus at extreme base and one on apical third . . . . . *decorata*

13. Size, approximately 5 mm. 14
Size larger 16

14. Forelegs uniformly yellowish; some spines of fore femora combined with their bases distinctly longer than diameter of segment . . . . . *sefrana*
Forelegs not uniformly yellowish; spines of fore femur combined with their bases shorter than diameter of segment . . . 15

15. Fore femora with several dark annuli, under surface with five large spiniferous processes (figs. 50B, C); posterior process of pygophore pointed . . . . . *chilensis*
Only apical portion of fore femora darkened, under surface with six to seven large spiniferous processes; process of pygophore bifid . . . . . *berlandi; sexdentata*

16. Abdomen rather uniformly yellowish brown, last two or three segments black at center, fore femora yellowish brown, their apical two-fifths black (fig. 47T); apical process of pygophore large, broadly triangular on basal two-thirds, then abruptly constricted and very slender (fig. 47U) . . *wahrmani*
Different combination of characters . . . 17

17. Head distinctly shorter than pronotum; fore tarsus half as long as tibia; fore femur with two subapical brown annuli, basal half with numerous small, rounded, dark spots . . . . . *hewitti*
Different combination of characters . . . 18

18. Fore femur three times as wide as coxa, yellowish brown, lacking spots or annuli, its ventral surface darkened . . . *mimeuri*
Fore femur not more than twice as wide as coxa, either spotted or annulated or both 19

19. Ventral projection of fore trochanter very short, not longer than wide at base, bearing very long, slender, spiniform seta (fig. 47G) . . . . . *geniculata*
Ventral projection of fore trochanter large, much longer than wide at base, bearing a relatively short, apical, spinelike seta (figs. 47D, J; 51B) 20

20. Postocular region of head gradually converging into neck in lateral view (fig. 51E); fore femora never with numerous small dark spots 21
Postocular region of head conspicuously decli-

vous posteriorly in lateral view, forming distinct angle with neck (figs. 47D, J); fore femora in some cases with numerous small, dark spots (fig. 47D) 22

21. Pronotum as wide anteriorly as posteriorly; some of spiniferous processes of fore femur (apical spines excluded) almost as long as process of trochanter; ventral surface of fore femur black . . . . . *basilewskyi*

Anterior border of pronotum much wider than hind border; processes of fore femur much shorter than process of trochanter; fore femora not black below . . . *domestica*

22. Most abdominal tergites distinctly tuberculate posteriorly at center 23

At most posterior abdominal tergites tuberculate at center, or none 24

23. Tubercles of abdominal tergites large and pointed; fore coxa with subapical dark annulus . . . . . *putoni*

Tubercles of abdominal tergites short and blunt; fore coxa subapically with a dark spot . . . . . *djurdjurana*

24. Apex of hind femora with a dark annulus (fig. 47H) . . . . . *moshesh*

Apex of hind femur white, dark annulus subapical 25

25. Head distinctly granulate; pronotum strongly constricted behind, its width before hind border one-half of that on anterior third; abdomen narrowly pedunculate on basal third . . . . . *anak*

Head not granulate; pronotum not strongly constricted behind, its width before hind border only slightly less than that on anterior third; abdomen fusiform, not narrowly pedunculate at base 26

26. Size, more than 10 mm.; pronotum longer than head (fig. 47D), its width equal to half of its length along midline . . . . . *icela*

Size, less than 10 mm.; pronotum not longer than head, its maximum width more than half of its length along midline . *capensis*

27. First and second segments of fore tarsus elongate, of about identical length, third very short (fig. 44D, F) . . . . . *antipoda*

First segment of fore tarsus elongate, second and third short (figs. 52C; 53F) . . .28

28. Size, about 11 mm.; posterolateral projections of pygophore of male with short spines in addition to bristles (fig. 53B, C) .. *thetis*

Size, about 15 mm.; posterolateral projections of pygophore with setae only (figs. 52L, N; 53K, L) 29

29. Hind lobe of pronotum distinctly detached from fore lobe (fig. 53E); basal portion of anteroventral series of fore femur composed of from four to six setae (fig. 53G); pygophore of male much shorter than wide in dorsal view (fig. 53L); parameres not overlapping when *in situ* (fig. 53K) . . . . . *phyllodoce*

Hind lobe of pronotum not distinctly detached from fore lobe (fig. 52A); basal portion of anteroventral series of fore femur composed of one or two setae only (fig. 52G); pygophore of male as long as wide in dorsal view (fig. 52L): parameres overlapping when *in situ* (fig. 52N) . . . . . *glabella*

30. Fore trochanter with one or several spiniform setae inserted on a distinct, though in some cases not very conspicuous, protuberance, these setae as strong as most of femur (figs. 45B, O; 47M; 56D) 31

Fore trochanter glabrous, or with setae not inserted on protuberances and distinctly more delicate than those of fore femur (figs. 45D, M; 47R; 54D, R; 55B) 45

31. Head, anterolateral tubercles of pronotum, mesonotum and metanotum, and forewings piceous; pronotum and a wide transverse fascia across subbasal region of forewings yellowish white (fig. 45A) . . *armstrongi*

Coloring different 32

32. Salience of fore trochanter with three or four spiniform setae (fig. 47M) . . . . *regina*

Salience of fore trochanter with one or two spiniform setae only 33

33. Posterior femora uniformly brownish or testaceous 34

Posterior femora with apical white annulus 38

34. Head posteriorly with four longitudinal piceous stripes 35

Pattern of head different 36

35. Length, 5 mm.; hind lobe of pronotum with 1+1 sublateral tubercles; apical process of pygophore of male bidentate (similar to fig. 56J) . . . . . *congoana*

Length, 10 mm.; posterior lobe of pronotum simple; apical process of pygophore simple, spiniform . . . . . *ellenbergeri*

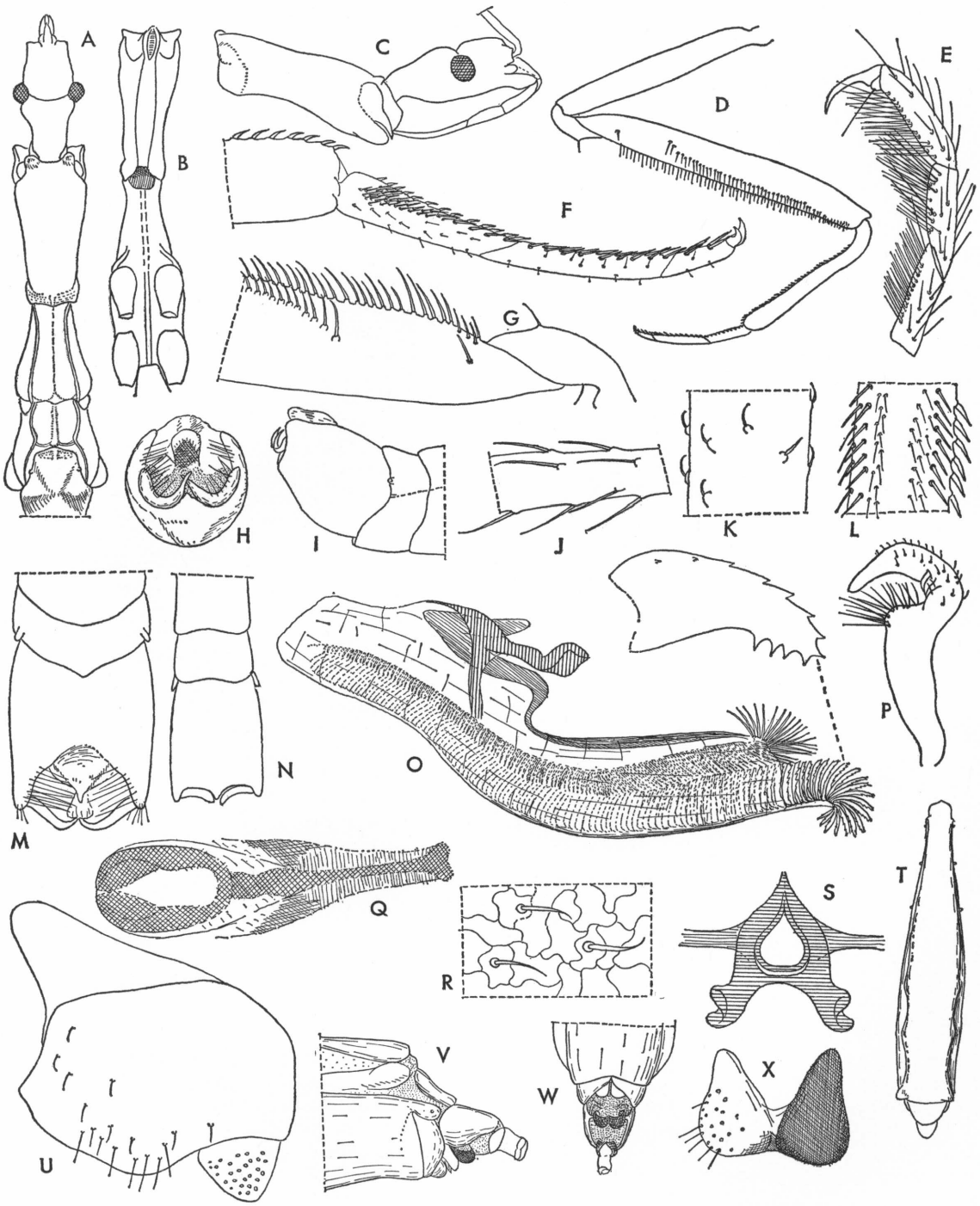
36. Pronotum not longer than wide (fig. 45I); forewings uniformly pale; process of pygophore bifid (fig. 45V) . . . . *woodwardi*

Pronotum slightly but distinctly longer than wide (fig. 45J); forewings with pattern elements; process of pygophore simple, spinelike (fig. 45K) 37

37. Spines of fore femur of about uniform size . . . . . *insolida*

Fore femur with five outstanding spines . . . . . *assimilata*

38. Discal cell of forewing with one faint, central, oval spot only (fig. 45C) . . *cunnamulla*


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X

Discal cell of forewing with irregular spots and/or veinlike pattern elements . . .39

39. Fore femur with one apical and one subapical dark annulus, basal half of articles with numerous small, rounded, pigmented spots; apical process of male pygophore (at least in *hewitti*) spiniform, simple 40

Pigmentation of fore femur different; apical process of male pygophore (where known) bifid 41

40. Length, about 10 mm.; rostrum castaneous, with basal half of second and base of third segment pale; pronotum dark, with a faint median fascia and basal angle pale . . . . . *hewitti*

Length, 8 mm.; rostrum brown, with apex of first and base of third segment pale; prothorax completely piceous . . *elegantula*

41. General body color piceous; head truncate posteriorly, with 1+1 small lateral projections near hind border dorsally (fig. 45N); discal cell much longer than apical free portion of M (fig. 45R); forelegs with only one claw (fig. 45S); discal cell of forewings much longer than vein emitted from its apex; length of insect, more than 8 mm. . . . . *obscura*

General body color testaceous to stramineous; postocular portion of head rounded behind in dorsal view, lacking projections; forelegs with two claws (fig. 56E); discal cell as long as (fig. 56A) or shorter than vein emitted from its apex; length of insect, not more than 6.5 mm. 42

42. Posterior lobe of pronotum relatively well developed, about one-third as long as fore lobe, its disc with 1+1 rounded, sublateral projections . . . . . *congoana*

Posterior lobe of pronotum much more reduced, less than one-third as long as fore lobe, its disc lacking projections (fig. 56A) 43

43. Fore lobe of pronotum large, strongly depressed, hind lobe wider than anterior portion of fore lobe . . . . . *gabonensis*

Fore lobe of pronotum smaller, convex, hind lobe not wider than fore lobe (fig. 56A) 44

44. Anteocular portion of head uniformly brownish . . . . . *macrophthalma*

Anteocular portion of head testaceous, with four longitudinal brown stripes . *oculata*

45. Pronotum whitish, mesonotum dark, contrast very evident (fig. 45H); pattern of forewings as shown in figure 45F . . *guttata*

Coloring of thorax and pattern of forewings different 46

46. Head with a distinct median elevation dorsally behind interocular furrow (fig. 45L, M); spines of fore femora strong, elongate (fig. 45M); color pattern of forewings as shown in figure 45Q . . . . . *musgravei*

Different combination of characters . . .47

47. Armature of fore femora consisting of strong, spinelike setae, some of which, combined with their bases, much longer than diameter of femur (fig. 54C, R, S) 48

Armature of fore femora consisting of slender, spinelike setae, none of which, combined with its base, longer than diameter of femur (figs. 45G; 47R) 49

48. Size, more than 10 mm.; apex of mid and hind femora white; large spines of fore femora, together with their bases, not more than twice as long as diameter of segment, bases much shorter than diameter of femur (fig. 54C, D); denticles of fore tibia short, beak-shaped (fig. 54H); spinulets of fore tarsus adpressed (fig. 54F) . . . . . *jimmiwum*

Size, less than 10 mm.; apex of mid and hind femora dark; large spines of fore femur, combined with their bases, not more than three times as long as diameter of article, some of basal tubercles as long as diameter of femur (fig. 54R, S); denticles of fore tibia erect, conical (fig. 54W); spinulets of base of first segment of fore tarsus semierect (fig. 54W) . . . . . *biroi*

49. Size, less than 8 mm.; fore lobe of pronotum subglobular (fig. 45J); mid and hind femora uniformly brownish . . . . . *insolida*

Size, about 10 mm. or more; pronotum much

FIG. 44 (OPPOSITE PAGE). *Ploiaria antipoda*. A. Head and thorax of male, seen from above. B. Thorax, ventral view. C. Head and prothorax of male, lateral aspect. D. Foreleg. E. Posterior tarsus. F. Apex of tibia, and tarsus of foreleg. G. Trochanter and base of femur of foreleg. H. Pygophore, seen from behind. I. Apex of abdomen of male, lateral view. J. Portion of hind tibia. K. Portion of hind femur. L. Portion of fore tibia. M. Genital region of male, dorsal view. N. Apex of abdomen of male, seen from below. O. Phallus, lateral aspect, spine of endosoma with higher magnification. P. Paramere. Q. Basal plate struts. R. Surface of abdominal sternite, high magnification. S. Articulatory apparatus. T. Abdomen of female, dorsal view, segmentation not shown. U. Gonocoxite with gonapophysis, setae of the latter not shown. V. Apex of abdomen of female, extended, lateral view. W. Apex of abdomen of female, ventral view. X. Syngonapophysis.

longer than wide; mid and hind femora not uniformly colored 50

50. Body dark; forewings stramineous, dusky along margins and veins; antennae and legs pale honey-colored, mid and hind femora each with a conspicuous, broad, fuscous, preapical band and a smaller dark spot near apex; body, antennae, and legs with abundant, short, pale pubescence, rather erect on pronotum and mesonotum . . . *mellea*

Different combination of characters . . .51

51. Males 52

Females 59

52. Apex of pygophore with 1+1 elongate, dorsolateral projections, each about as long as width of pygophore, parameres long and slender, sickle-shaped (fig. 55T, X, Y) . . . . . *circe*

Apex of pygophore lacking projections mentioned 53

53. Parameres widely overlapping (fig. 55M) . . . . . *maai*

Parameres not overlapping 54

54. Posterosuperior border of pygophore with a more or less distinctive median projection (fig. 47Q, Y) 55

Posterosuperior border of pygophore lacking median projection 58

55. Posterior process of pygophore wide-angled (fig. 47Y) 56

Posterior process of pygophore more narrow, pointed (fig. 47Q) or spinelike 57

56. Mid and hind femora with subapical pale annulus; parameres rectangularly bent subapically (fig. 47S) . . . . . *halosydne*

Mid and hind femora with apical pale annulus; parameres curved but not bent apically (fig. 47W) . . . . . *apicata*

57. Posterior process of pygophore elongate, spinelike, set distinctly within posterior margin of pygophore; mid and hind femora with subapical pale annulus . . *bakeri*

Posterior process of pygophore not spinelike (fig. 47Q), continous with hind border of pygophore; mid and hind femora with apical pale annulus . . . . . *nitida*

58. Apex of pygophore nearly straight across . . . . . *recta*

Apex of pygophore slightly emarginated . . . . . *media*

Apex of pygophore deeply emarginated (fig. 47 O) . . . . . *ultima*

59. Transverse thickening of hind wing narrow (figs. 47P; 55K) 60

Transverse thickening of hind wing wide (fig. 55U) 61

60. General color testaceous; some transverse dark bands in region basad of discal cell of forewing . . . . . *ultima*

General color piceous; forewings lacking dark transverse bands . . . . . *maai*

61. General color of body and appendages testaceous to stramineous 62

General color of body and appendages fuscous to piceous . . . . . *halosydne*

62. Mid and hind femora very conspicuously annulated with light and dark . . . . . *circe*

Mid and hind femora with annuli on apical portion only 63

63. Pronotum highly glossy, delicate pubescence difficult to perceive . . . . . *nitida*

Pronotum subshining, pubescence obvious . . . . . *apicata*

Ploiaria concolor, *funebris*, *greeni*, *isadas*, *kocheri*, *longiventris*, *modesta*, *montivaga*, *pallida*, *praesentans*, and *sachtlebeni* could not be included in this key.

Ploiaria abrupta Noualhier

Ploiaria abrupta NOUALHIER, 1895, p. 167, pl. 1, fig. 5.

Good figures of this species were given by Villiers (1943).

DISTRIBUTION: Tunisia; Algeria; Morocco.

TYPE: Unknown.

Ploiaria albipennis McAtee and Malloch

Ploiaria albipennis MCATEE AND MALLOCH, 1925, p. 60.

I have examined a paratype of this species. It agrees structurally very closely with *macrophthalma* and is perhaps not really different from it.

DISTRIBUTION: Mexico.

TYPE: Male, Muséum National d'Histoire Naturelle.

Ploiaria alexanderi Wygodzinsky

Figures 2E; 49R, T

Ploiaria alexanderi WYGODZINSKY, 1954b, p. 301, figs. 36–43.

Some of the characters of this species are illustrated here.

DISTRIBUTION: Peru.

TYPE: Female, the American Museum of Natural History.

Ploiaria anak Distant

Ploiaria anak DISTANT, 1909, p. 505.

Distant (1910) gave a figure of this species.

MATERIAL EXAMINED: *India*: Rajasthan:

Mahwah, January 5, 1962 (Ross and Cavagnaro; the California Academy of Sciences) one male, one female, one nymph; 4 miles east of Godhra, January 12, 1962 (Ross and Cavagnaro; the California Academy of Sciences), one male, (Ross and Cavagnaro; the American Museum of Natural History), one female. *West Pakistan*: Margala Pass near Taxilla, December 17, 1961 (Ross and Cavagnaro; the California Academy of Sciences), one male.

DISTRIBUTION: India; West Pakistan.

TYPE: British Museum (Natural History).

Ploiaria antipoda Bergroth

Figure 44A–X

This species has been illustrated in detail by Wygodzinsky (1950c); these figures are here used again and complemented with additional drawings.

The proportions of the anterior tarsi are striking (fig. 44D) in that the first and second segments are elongate, subequal in size, and the third is very short; these proportions resemble those found in some otherwise unrelated species. The under surface of the segments of the mid and hind tarsi bears very numerous slender hairs, but a scopula has not been evolved (fig. 44E); the claws are simple. The structure of the male genitalia is rather similar to that of the species of the "Elymas" group. The phallus (fig. 44 O) is symmetrical; the endosoma possesses 2+2 rows of slender, spinelike processes. In the female (fig. 44T–X), the gonocoxites are partly covered by the seventh sternite; the syngonapophysis is conspicuous and heavily sclerotized.

MATERIAL EXAMINED: Ohakune, Wellington (T. R. Harris; Museum Zoologicum Universitatis), one male, one nymph; Karori, April 17, 1920 (Museum Zoologicum Universitatis), one female.

DISTRIBUTION: New Zealand (North Island).

TYPE: Unknown.

Ploiaria apicata McAtee and Malloch

Figure 47R, W

Ploiaria apicata MCATEE AND MALLOCH, 1926, p. 143, figs. 46–48.

The forelegs of this species are similar to those of *maai* (see fig. 55B); the mid and hind tarsi possess a scopula on the third segment, and the claws have a pointed process; the endosoma of the male is asymmetrical.

DISTRIBUTION: Borneo.

TYPE: Male, United States National Museum.

Ploiaria aptera McAtee and Malloch

Ploiaria aptera MCATEE AND MALLOCH, 1925, p. 66.

MATERIAL EXAMINED: United States: Arizona: Cochise County: Southwestern Research Station, 5 miles west of Portal, June 14, 1957, 5400 feet (M. Statham; the American Museum of Natural History), one female.

DISTRIBUTION: United States (Arizona).

TYPE: Female, United States National Museum.

Ploiaria armstrongi Wygodzinsky

Figure 45A, B

Ploiaria armstrongi WYGODZINSKY, 1956, p. 215, 161–168.

The general aspect of this insect, and the structure of its forelegs, are figured here.

DISTRIBUTION: Australia (New South Wales).

TYPE: Male, Australian Museum.

Ploiaria assimilata Van Duzee

Ploiaria assimilatus VAN DUZEE, 1935, p. 321.

DISTRIBUTION: Marquesas.

TYPE: Male, Bernice P. Bishop Museum.

Ploiaria bakeri McAtee and Malloch

Ploiaria (Luteva) bakeri MCATEE AND MALLOCH, 1926, p. 144, fig. 50.

DISTRIBUTION: Philippines.

TYPE: Male, United States National Museum.

Ploiaria basilewskyi Villiers

Ploearia basilewskyi VILLIERS, 1961, p. 42, figs. 17, 18.

DISTRIBUTION: Congo (Léopoldville).

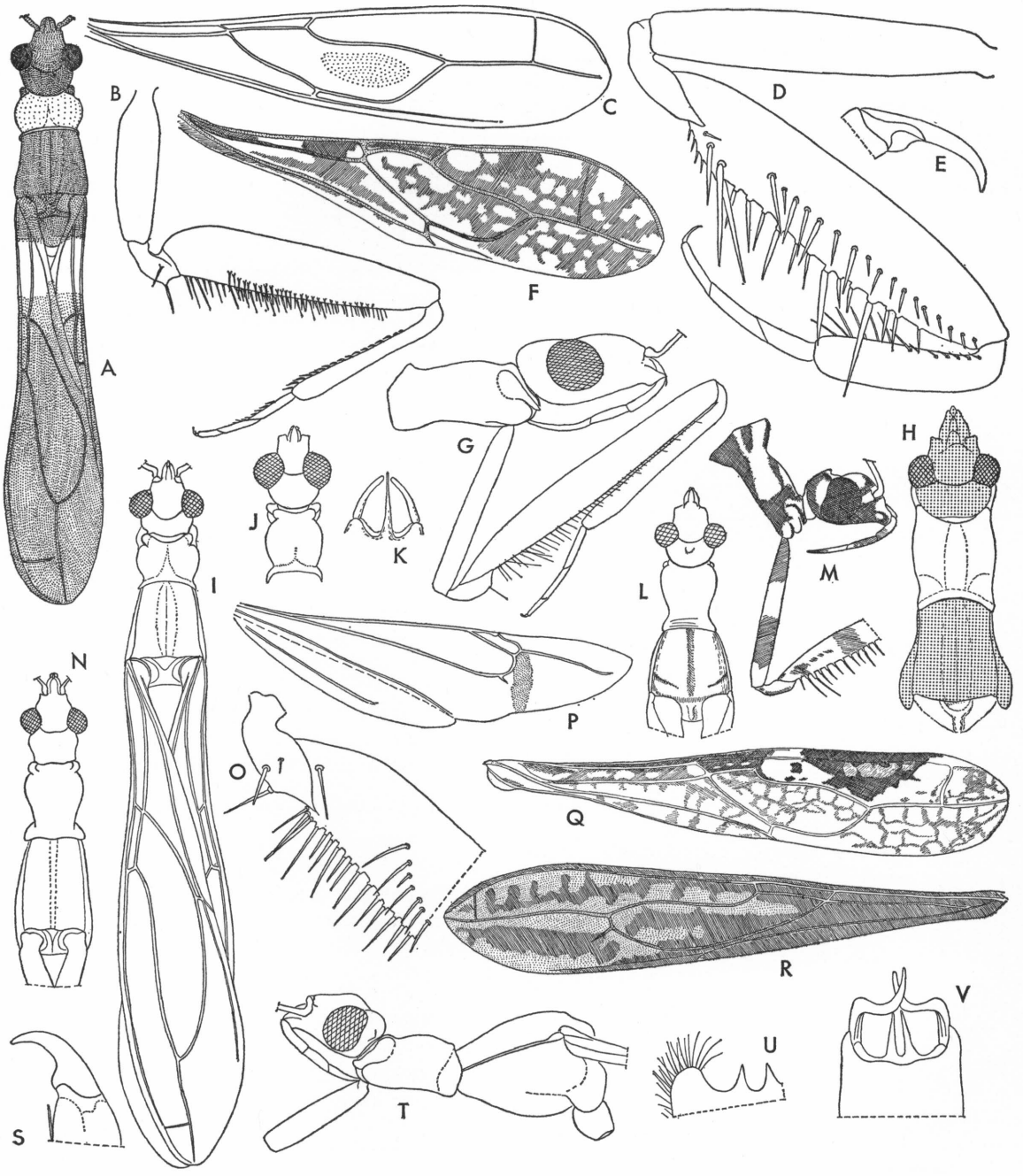
TYPE: Musée Royal de l'Afrique Centrale.

Ploiaria bequaerti Wygodzinsky

Figure 46B

Ploiaria bequaerti WYGODZINSKY, 1954b, p. 303, figs. 44–49.

The structure and color pattern of the foreleg are illustrated here.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V

DISTRIBUTION: Jamaica.

TYPE: Female, Museum of Comparative Zoölogy.

Ploiaria berlandi Villiers

Ploearia berlandi VILLIERS, 1943, p. 95, figs. 1, 16, 27, 28.

It is possible that this species is identical with *sexdentata*.

DISTRIBUTION: Morocco.

TYPE: Male, Muséum National d'Histoire Naturelle.

Ploiaria biroi, new species

Figure 54P–Z, AA, BB

DESCRIPTION: Macropterous male: Length, 9 mm.

General color castaneous to piceous. Two longitudinal lines on head dorsally behind eyes, anteocular portion laterally, base and apex of rostral segments, basal half and a subapical annulus of first antennal segment all stramineous. Abdomen of general body color, with some faint lighter-colored regions. Pygophore and parameres testaceous. Fore coxa and trochanter castaneous; femur flavous, faintly clouded with castaneous, one subapical annulus and extreme apex castaneous; tibia flavous, apical two-fifths castaneous; tarsus flavous, tingled with castaneous. Mid and hind legs flavous to ochraceous; femora piceous apically. Forewings ferruginous, spotted with whitish. Body surface smooth, slightly shining, only abdomen dull; pubescence short, adpressed, inconspicuous.

Head and rostrum as shown in figure 54P, S. Interocular distance dorsally slightly shorter than width of eyes (0.9/1); in lateral view eyes attaining level of dorsal and ventral surface of head. Basal half of basal antennal segment with numerous long, semierect hairs, their length about five times diameter of segment; length of first segment, 6.4 mm.; relative length of segments, 1/0.75/0.26/0.26.

Thorax as shown in figure 54P, S. Fore lobe of pronotum shortly cylindrical, its sides parallel; hind lobe well developed, separated from front lobe by a conspicuous constriction; its disc smooth. Mesonotum about as long as pronotum, less than twice as long as wide, strongly convex; median longitudinal furrow narrow, shallow.

Forelegs very slender (fig. 54S). Coxa slightly longer than pronotum and mesonotum combined. Trochanter almost glabrous. Femur slender, about 14 times as long as maximum width. Posteroventral series (fig. 54R) composed of 10 or 11 long and slender spines inserted on elongate basal processes, their size increasing from base to apex of segment, several longer than diameter of femur; one very short spine inserted between last three large processes. Anteroventral series (fig. 54R) composed of about 20 long spines inserted on short, wartlike bases, spines longest toward middle of segment; series interrupted at base, four spines basad of interruption. Space between series with a large number of delicate long hairs (fig. 54R). Tibia slightly less than half as long as femur; its under surface with one series of erect, spinelike setae about as long as diameter of segment, and one row of heavily pigmented, semierect spinulets which increase in size toward apex of segment. Tarsus (fig. 54W) two-thirds as long as tibia; first segment longest, second three-fourths, third half, as long as first; under surface of segments with one somewhat irregular row of spinulets similar to those of tibia, largest on basal half of first segment. Two well-developed claws, subequal in size (fig. 54Q). Posterior femora surpassing

FIG. 45 (OPPOSITE PAGE). A, B. *Ploiaria armstrongi*, male. A. General aspect, with color pattern. B. Foreleg. C. *Ploiaria cunnamulla*, forewing. D–F. *Ploiaria guttata*. D. Foreleg. E. Claws of foreleg. F. Forewing, with color pattern. G. *Ploiaria insolida*, male, anterior portion of body, lateral view. H. *Ploiaria guttata*, female, head and thorax, dorsal view, with color pattern. I. *Ploiaria woodwardi*, male, general aspect. J, K. *Ploiaria insolida*, male. J. Head and pronotum, dorsal aspect. K. Apex of pygophore, seen from behind. L, M. *Ploiaria musgravei*. L. Anterior portion of body, dorsal view. M. Anterior portion of body, lateral aspect, with color pattern. N, O. *Ploiaria obscura*, winged female. N. Anterior portion of body, dorsal view. O. Trochanter and base of fore femur. P, Q. *Ploiaria musgravei*. P. Hind wing. Q. Forewing, with color pattern. R, S. *Ploiaria obscura*. R. Forewing, with color pattern. S. Praetarsus of foreleg, with claw. T. *Ploiaria woodwardi*, male, anterior portion of body, lateral view. U. *Ploiaria obscura*, apex of pygophore, seen from behind. V. *Ploiaria woodwardi*, apex of pygophore with parameres, seen from behind.

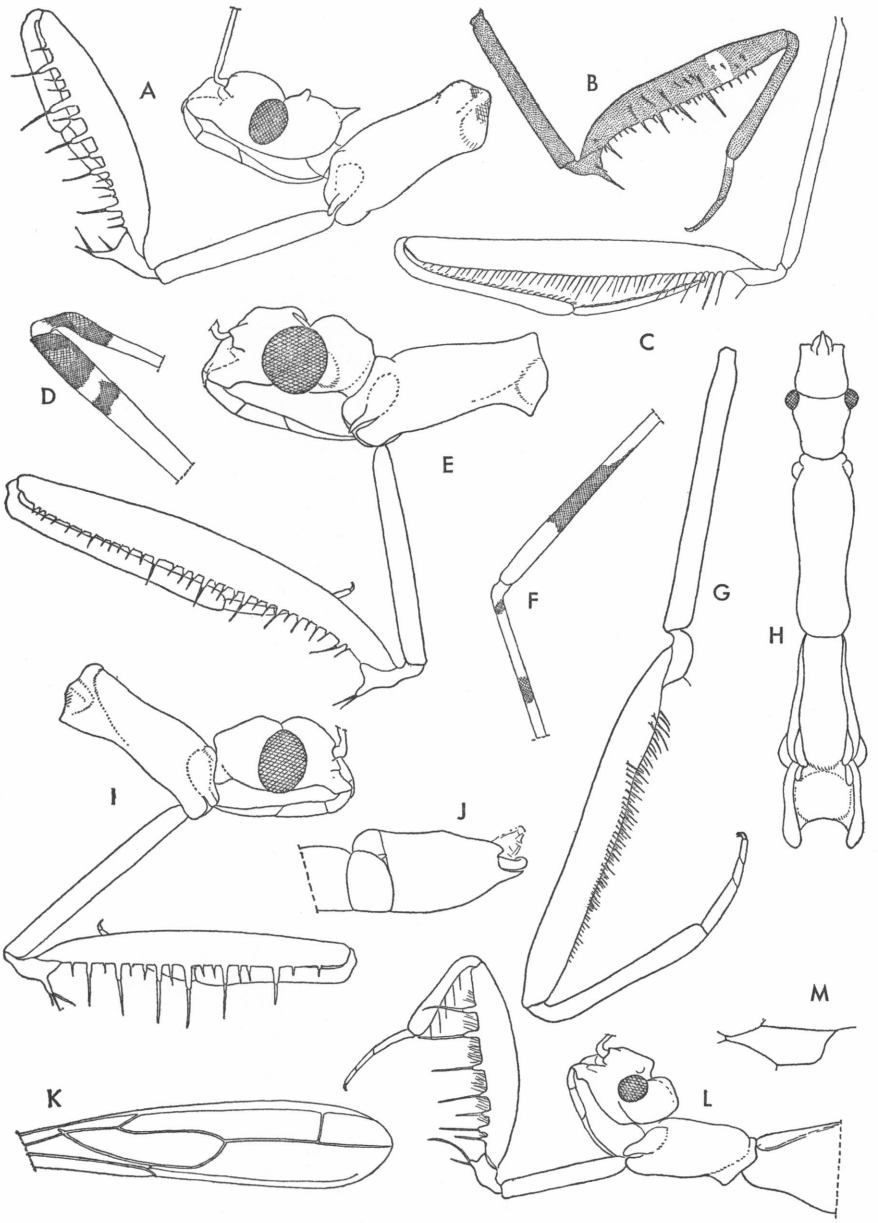


FIG. 46. A. *Ploiaria hirticornis*, male, anterior portion of body, lateral aspect. B. *Ploiaria bequaerti*, foreleg, with color pattern. C. *Ploiaria setulifera*, foreleg. D. *Ploiaria granulata*, femurotibial articulation of mid and hind legs, with color pattern. E. *Ploiaria reticulata*, male, anterior portion of body, side view. F. *Ploiaria similis*, femurotibial articulation of mid and hind legs, with color pattern. G, H. *Ploiaria darlingtoni*, micropterous male. G. Foreleg. H. Anterior portion of body, dorsal view. I–K. *Ploiaria similis*, male. I. Anterior portion of body, side view. J. Apical region of abdomen, lateral aspect. K. Portion of forewing. L, M. *Ploiaria uniseriata*. L. Anterior portion of body of apterous female, lateral view. M. Discal cell of forewing.

apex of abdomen. Mid and hind femora with isolated, short, slender hairs (fig. 54X); tibiae with microchaetae and macrochaetae (fig. 54BB). Tarsal segments subequal in length (fig. 54V); chaetotaxy as illustrated; last segment ventrally with a faintly developed scopula, its component setae not numerous. Claws slender, with an elongate, pointed submedian process (fig. 54V).

Shape and venation of forewings as shown in figure 54T, almost attaining apex of abdomen. Vein limiting inner border of discal cell undulated; apical portion of discal cell narrow. Hind wings not examined.

Abdomen slender. Tergites and sternites with microchaetae and macrochatae. Eighth sternite and tergite both well developed, entirely exposed (fig. 54U). Pygophore occupying one-seventh of total length of abdomen, its shape as shown in figure 54U, AA; posteroventral margin with an elongate subhorizontal process, wide at base, narrowly pointed apically. Parameres elongate, slender, curved, their points meeting shortly basad of level of apex of median process; their chaetotaxy as shown in figure 54Y. Phallus as shown in figure 54Z, symmetrical. Dorsal and ventral sclerotization of phallotheca well developed, narrow; lateral walls of phallotheca partly sclerotized. Endosoma with a single series of teeth, decreasing in size toward apex (invaginated condition).

MATERIAL EXAMINED: New Guinea: Stephansort, Astrolabe Bay, May 10, 1897 (Biró; Bernice P. Bishop Museum), one male holotype.

OBSERVATIONS: Among the Pacific *Ploiaria* of the "Elymas" group, this new species is perfectly individualized by the structure of the forelegs and the pygophore.

Ploiaria brincki Wygodzinsky

Figure 47A, B

Ploiaria brincki WYGODZINSKY, 1958a, p. 121, figs. 25–30.

The general aspect of this species and the structure of its forelegs are illustrated here.

DISTRIBUTION: South Africa (Cape Province).

TYPE: Female, Zoological Institute, University, Lund.

Ploiaria brunnea McAtee and Malloch

Ploiaria brunnea MCATEE AND MALLOCH, 1925, p. 54, fig. 69.

DISTRIBUTION: Brazil; Panama.

TYPE: Male, Carnegie Museum.

Ploiaria buscki Wygodzinsky

Ploiaria macrophthalma: MCATEE AND MALLOCH, 1925, p. 53, figs. 67, 68 (*nec* Dohrn, 1860).

Ploiaria buscki WYGODZINSKY, 1954b, p. 305.

DISTRIBUTION: Panama.

TYPE: Not designated.

Ploiaria californiensis Baker

Ploiaria californiensis BAKER, 1910, p. 226, figs. 97E–97G.

The exact position of this species remains unknown. McAtee and Malloch (1925) suggested that it might be the nymph of *reticulata*, a species described by Baker at the same time, or, if adult, related to what is now known as *chilensis*. The available data do not support either suggestion.

DISTRIBUTION: United States (California).

TYPE: Unknown.

Ploiaria capeneri Wygodzinsky

Figure 48A–U

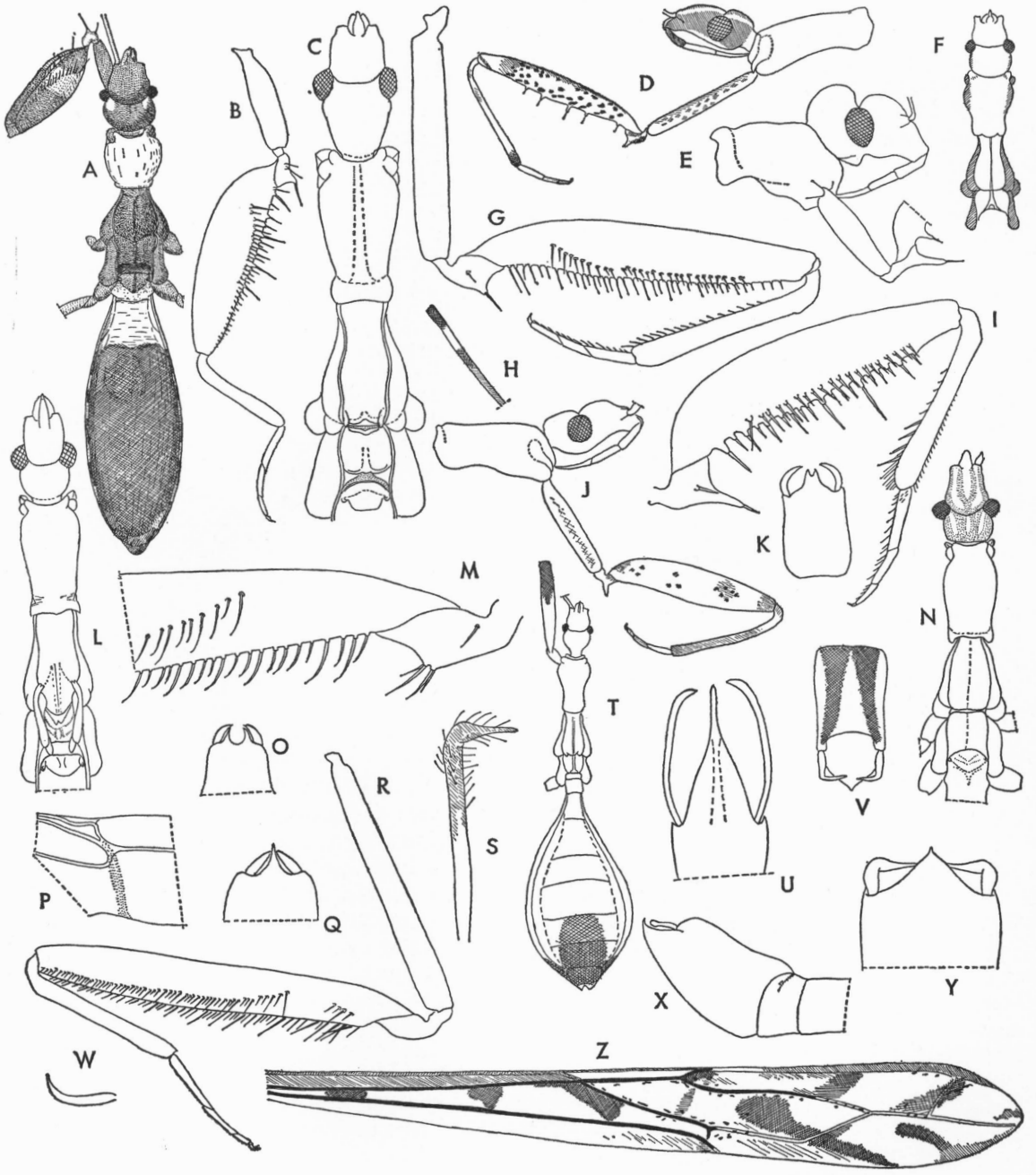
Ploiaria capeneri WYGODZINSKY, 1952c, p. 153, figs. 9–14.

Ploearia wygodzinskyi VILLIERS, 1961, p. 41, figs. 11–16 (new synonymy).

There is considerable variation in size, relative measurements of the different parts of the body, and coloration among the specimens examined; there are specimens which are completely black, with only the postocular portion somewhat lighter dorsally. The males described by Villiers (1961) as *wygodzinskyi* seem to fall within the range of variability of the species.

In addition to illustrations taken from the original description, drawings representing the chaetotaxy and structure of the mid and hind legs and of the male genitalia are presented here.

MATERIAL EXAMINED: *South Africa:* Pondoland: Port St. John, June 12–30, 1923, April 1–15, 1924 [R. E. Turner; British Museum (Natural History)], one male, one female. *Zululand:* Eshowe, March 23–31, 1926 [R. E. Turner; British Museum (Na-


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z

tural History)], one female. *Natal:* Durban, December 4, 1904 [G. F. Leigh; British Museum (Natural History)], two females.

DISTRIBUTION: South Africa (Natal, Zululand, Pondoland, Cape Province).

TYPES: Of *capeneri*, female, Natal Museum; of *wygodzinskyi*, male, Muséum National d'Histoire Naturelle.

Ploiaria capensis Villiers

Ploearia capensis VILLIERS, 1949a, p. 311, figs. 128, 129.

DISTRIBUTION: South Africa (Cape Province).

TYPE: Female, Zoologisches Museum, Hamburg.

Ploiaria carolina (Herrich-Schäffer)

Emesodema carolina HERRICH-SCHÄFFER, 1853, p. 8, fig. 936.

Luteva carolina: LETHIERRY AND SEVERIN, 1896, p. 74.

Ploiaria carolina: NATHAN BANKS, 1909, p. 44.

McAtee and Malloch (1925) illustrated the pygophore of *carolina*.

MATERIAL EXAMINED: United States: Georgia: Roberta, August 16, 1945 (Usinger; collection Usinger), one male; Baker County: 1945 (Usinger; the American Museum of Natural History), one male.

DISTRIBUTION: United States (Georgia, South Carolina).

TYPE: Unknown.

Ploiaria carvalhoi, new species

Figure 49A–Q, V

DESCRIPTION: Macropterous male: Length, 7 mm. General aspect as shown in figure 49A.

General color fulvous, clouded with castaneous. Antennae piceous. Forelegs ochraceous, clouded with castaneous; femur at base, at middle, and especially at apex, tibia completely, dark. Mid and hind legs ochraceous; femora with a piceous subapical and a white apical annulus, latter narrow on mid, and wide on hind, femur; posterior tibia with a basal white annulus. Forewings whitish, not iridescent, coarsely reticulate with fuscous (fig. 49A); Sc and R, as well as space between them, coccineous. Hind wings whitish, not iridescent, veins not darkened. Body surface slightly shining, microscopically reticulate. Pubescence extremely short, inconspicuous.

Head and rostrum as shown in figure 49A, B; distance between eyes dorsally slightly shorter than width (0.85/1); eyes not attaining level of under surface of head in lateral aspect. Antennae glabrous. Length of first segment, 5.8 mm.; relative length of segments, 1/0.9/0.19/0.21.

Thorax as shown in figure 49A, B. Sides of fore lobe of pronotum distinctly converging posteriorly; anterior portion convex, posterior half depressed; hind lobe short, microscopically reticulate like fore lobe. Mesonotum very slightly longer than wide, convex, its median longitudinal depression deep, not quite attaining posterior border.

Forelegs stout (fig. 49H). Coxa one-fifth longer than prothorax. Trochanter with one lateral and one ventral spinelike seta (fig. 49C). Femur slightly S-shaped, seven times as long as maximum width. Ventral series composed of slender, spinelike setae of medium and small size, inserted on short, wartlike protuberances; none of these setae attaining length of diameter of femur. Posteroventral series composed of approximately 50

FIG. 47 (OPPOSITE PAGE). A, B. *Ploiaria brincki*, female. A. General aspect, with color pattern. B. Foreleg. C. *Ploiaria geniculata*, micropterous female, anterior portion of body, dorsal view. D. *Ploiaria icela*, male, anterior portion of body, side view, color pattern shown on head and foreleg. E, F. *Ploiaria mosconai*. E. Anterior portion of body, side view. F. Anterior portion of body, dorsal aspect. G. *Ploiaria geniculata*, foreleg. H. *Ploiaria moshesh*, apex of posterior femur, with color pattern. I. *Ploiaria mosconai*, foreleg. J. *Ploiaria moshesh*, male, anterior portion of body, side view, color pattern shown on foreleg only. K. *Ploiaria mosconai*, pygophore, posterior view. L, M. *Ploiaria regina*. L. Anterior portion of body of micropterous female, dorsal view. M. Trochanter and base of fore femur. N. *Ploiaria moshesh*, male, anterior portion of body, dorsal view, color pattern shown on head only. O, P. *Ploiaria ultima*. O. Apex of pygophore, seen from behind. P. Detail of hind wing. Q. *Ploiaria nitida*, apex of pygophore, seen from behind. R. *Ploiaria apicata*, foreleg. S. *Ploiaria halosydne*, paramere. T, U. *Ploiaria wahrmani*. T. Female, general aspect, with color pattern. U. Apex of pygophore, seen from behind. V. *Ploiaria halosydne*, pygophore, dorsal view. W. *Ploiaria apicata*, outline of paramere. X–Z. *Ploiaria halosynde*. X. Apex of abdomen of male, lateral view. Y. Apex of pygophore, seen from behind. Z. Forewing, with color pattern.

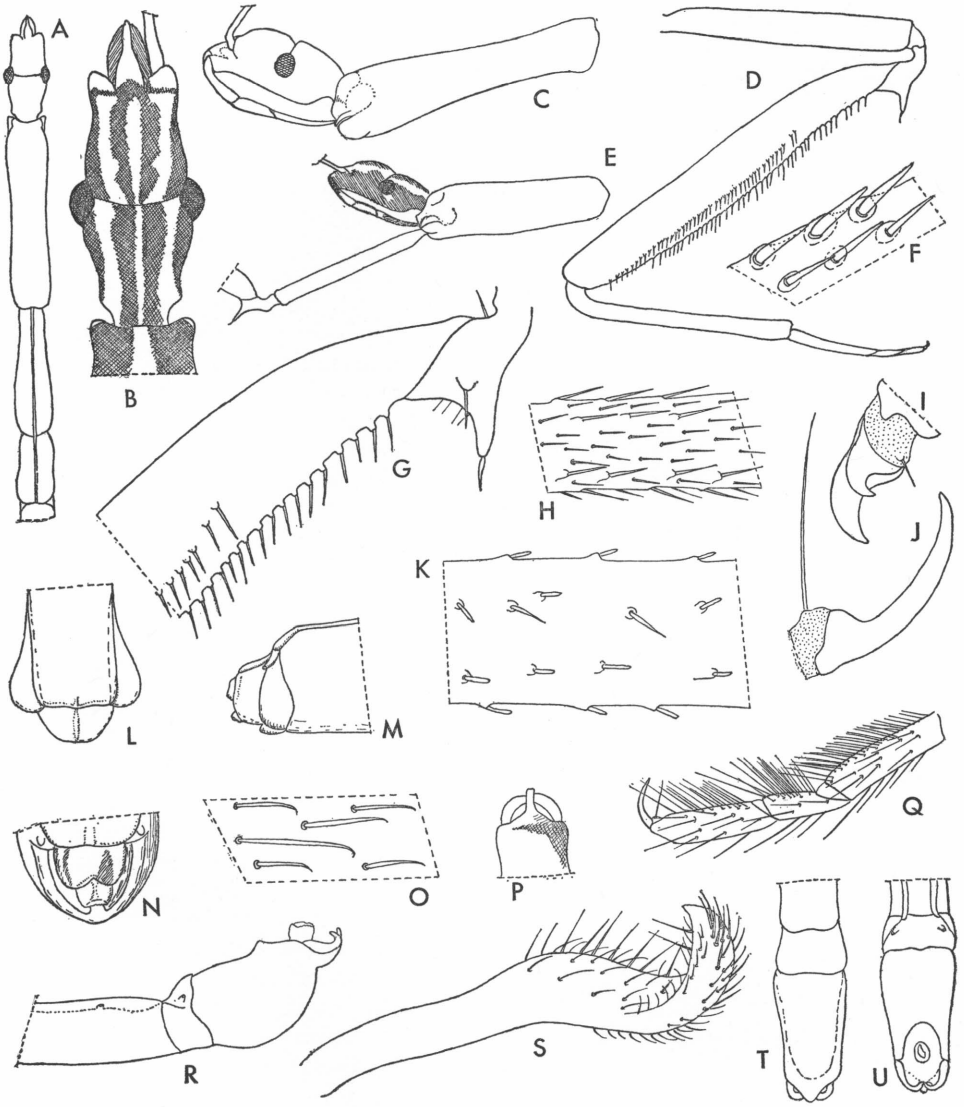


FIG. 48. *Ploiaria capeneri*. A. Anterior portion of body of female, dorsal view. B. Head of female, dorsal view, with color pattern. C. Head and prothorax of male, lateral view. D. Foreleg. E. Anterior portion of body of female, side view, color pattern shown on head only. F. Spines of under surface of fore tibia. G. Trochanter and base of fore femur. H. Detail of posterior tibia. I. Praetarsus and claws of foreleg. J. Praetarsus and claw of hind leg. K. Detail of posterior femur. L. Genital region of female, dorsal view. M. Apex of abdomen of female, lateral aspect. N. Genital region of female, seen from behind. O. Setae of pygophore. P. Pygophore, seen from behind. Q. Posterior tarsus. R. Apex of abdomen of male, side view. S. Paramere. T. Genital region of male, seen from below. U. Genital region of male, dorsal aspect.

spinelike setae, decreasing in size toward apex of article. Anteroventral series not interrupted at base, consisting of about 45 spinelike setae. Tibia three-fifths as long as femur, its lower surface with one series of stout, and one of very slender, short, inclined spines (fig. 49F). Tarsus two-thirds as long as tibia; first and second segments long, subequal in size, third about half as long as two preceding; under surface of segments with two rows of slender, adpressed, spinelike setae (fig. 49G). Two claws, subequal in size (fig. 49E). Posterior femur surpassing apex of forewings by 3.2 mm. Femur and tibia with microchaetae and macrochaetae of inconspicuously different sizes, those of femora (fig. 49D) shorter than those of tibia (fig. 49J). Tarsal segments subequal in size, setae simple, not numerous (fig. 49I); claws slender, simple.

Forewings surpassing apex of abdomen by 0.5 mm., their shape and venation as shown in figure 49A. Vein limiting inner margin of discal cell abruptly bent beyond middle, thus discal cell truncate distally. Venation of hind wings as usual for the genus.

Abdomen slender, hardly narrowed toward base. Seventh sternite and tergite both well developed, entirely exposed (fig. 49K, L). Pygophore occupying one-seventh of total length of abdomen, its posterior margin with an obliquely upward-directed, large, spinelike process (fig. 49Q). Parameres S-shaped, their points meeting apex of median process; their exact shape and chaetotaxy as shown in figure 49P. Phallus symmetrical. Center of sclerite formed by fused struts with 1+1 lateral projections (fig. 49M, N). Phallotheca membranous; dorsal and ventral sclerotizations well developed, the former wide (fig. 49 O). Endosoma with 1+1 rows of large, spine-shaped projections, overlapping when invaginated (fig. 49V).

MATERIAL EXAMINED: Brazil: Minas Geraes: Carmo do Rio Claro, Fazenda Alegria, January 1958 (Carvalho and Becker; Museu Nacional), one male holotype.

OBSERVATIONS: The coloring, and the structure of the male genitalia, distinguish this species from its congeners. It is named for the hemipterist José Cândido de Melo Carvalho, one of its collectors.

Ploiaria chilensis (Philippi)

Figures 3B, I; 4C, H, K; 50A–M

Stenolemus chilensis PHILIPPI, 1862, p. 38.
Ploiaria chilensis: KUSCHEL, 1951, p. 113.
Emesella dohrni SIGNORET, 1863, p. 587.
Ploearia dohrni: STÅL, 1872b, p. 127.
Emesodema huttoni SCOTT, 1874, p. 271.
Ploearia huttoni: BERGROTH, 1923, p. 399.
Cerascopus canariensis NOUALHIER, 1895, p. 167, pl. 1, fig. 1.
Ploearia canariensis: LETHIERRY AND SEVERIN, 1896, p. 259.
Cerascopus grassator: PUTON, 1889, p. 293 (*nec* Puton, 1874).
Ploiaria marginata: MCATEE AND MALLOCH, 1925, p. 65 (*nec* Heineken, 1830).
Ploiaria domestica: WYGODZINSKY, 1946a, p. 469 (*nec* Scopoli, 1786).

The general aspect of this species (as *Ploiaria dohrni*), as well as its phallus, was illustrated by Wygodzinsky (1948d). In the present paper, details of the fore and hind legs (fig. 50B–I), the shape of the spinelike processes of the endosoma (fig. 50L, M), of the paramere (fig. 49Q), and of the spine-like processes of the endosoma (fig. 50L, M) are added. Good illustrations of the head, thorax, and external genitalia of the male can be found in Villiers (1943; as *P. canariensis*). The tarsi of the mid and hind legs lack specializations; the phallus is symmetrical.

MATERIAL EXAMINED: *United States:* California: San Clemente, May, 1932 (T. D. A. Cockerell; United States National Museum), one male; San Diego, Balboa Park, October 2–4, 1956 (A. M. Nadler; the American Museum of Natural History), one male; San Francisco, January 5, 1949 (B. Keh; California Insect Survey), one female; Mendocino County: Mendocino, September 22, 1958 (J. R. Helfer; the California Academy of Sciences), one male. *Peru:* Lima, Cerro Agostino, September 10, 1951, in abandoned mine under stones (W. Weyrauch, number 6942; the American Museum of Natural History), one male, one female. *Chile:* Isla San Ambrosio, September, 1960 (Universidad de Chile), one nymph. *Canary Islands:* Tenerife (A. Cabrera; the University of Kansas), one male, identified by McAtee and Malloch as *P. marginata* Heineken. *Spain:* Tortosa (the University of Kansas), one male.

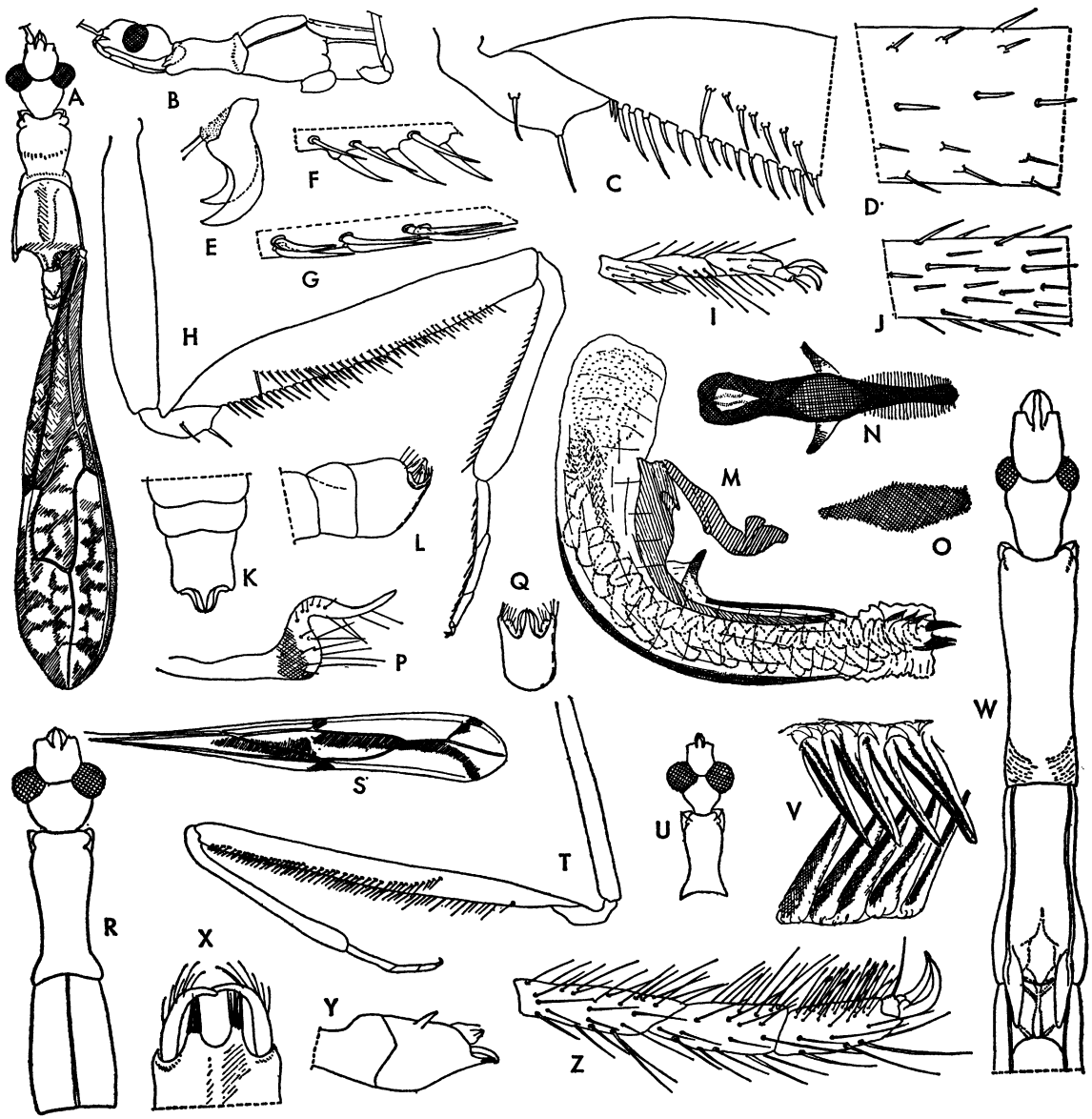


FIG. 49. A–Q. *Ploiaria carvalhoi*, male. A. General aspect, color pattern shown on forewing only. B. Anterior portion of body, side view. C. Trochanter and base of fore femur. D. Detail of posterior femur. E. Claws of forelegs. F. Spines of under surface of fore tibia. G. Spines of under surface of apex of first tarsal segment of forelegs. H. Foreleg. I. Posterior tarsus. J. Portion of hind tibia. K. Genital segments, ventral view. L. Apex of abdomen, lateral aspect. M. Phallus, lateral view. N. Basal plate struts. O. Dorsal sclerotization of phallosoma. P. Paramere. Q. Pygophore with parameres, seen from behind. R. *Ploiaria alexanderi*, female, head and thorax, seen from above. S. *Ploiaria penai*, forewing, with color pattern. T. *Ploiaria alexanderi*, foreleg. U. *Ploiaria geijskesi*, female, head and pronotum, dorsal view. V. *Ploiaria carvalhoi*, spines of endosoma, high magnification. W. *Ploiaria denieri*, male, anterior portion of body, dorsal view. X–Z. *Ploiaria maria*. X. Apex of pygophore, ventral aspect. Y. Genital region, lateral view. Z. Hind tarsus.

DISTRIBUTION: Spain; Morocco; Azores Islands; Madeira Islands; Canary Islands; United States (California); Colombia; Peru; Brazil; Argentina; Chile (mainland and Juan Fernández Islands); Australia: Lord Howe Island; New Zealand.

TYPES: Of *chilensis*, unknown; of *dohrni*, (?)Naturhistorisches Museum, Vienna; of *huttoni*, British Museum (Natural History); of *canariensis*, Muséum National d'Histoire Naturelle.

Ploiaria circe (Kirkaldy), new combination

Figures 6C; 55T, U, X, Y

Luteva circe KIRKALDY, 1908b, p. 373, fig. 3.

This species belongs to the "Elymas" group. The forelegs are much like those of *maai* (see fig. 55B), but there are three setae basad of the interruption of the anteroventral series. The third segment of the mid and hind tarsi is provided with a scopula, but the claws lack projections. A portion of the hind wing (fig. 55U) and the external genitalia of the male (fig. 55T, X, Y) are here illustrated; the phallus is asymmetrical, somewhat similar to that of *maai* (see fig. 55Q), but the endosoma possesses only a single row of toothlike projections.

MATERIAL EXAMINED: Fiji: Viti Levu: Rewa, 1905 (Muir; Bernice P. Bishop Museum), one male; Navai Mill, near Nandarivatu, September 15, 1938, 2500 feet (Zimmerman; the American Museum of Natural History), one male, (Zimmerman; Bernice P. Bishop Museum), one female; Belt Road, 44 miles west of Suva, July 23, 1938, beating shrubs, 300 feet (E. C. Zimmerman; Bernice P. Bishop Museum), one female; (A. M. Lea; South Australian Museum), two males, two females. Ovalau: Draiba Trail, 600 to 1000 feet (E. C. Zimmerman; Bernice P. Bishop Museum), three males; Thawathi, July 12, 1938, beating, 600 to 800 feet (Zimmerman; Bernice P. Bishop Museum), one female; June, 1934, (A. M. Lea; South Australian Museum), one female. Nairio Moala Island: August 24, 1938, beating shrubs, 1000 feet (Zimmerman; Bernice P. Bishop Museum), one female. Taveuni: May (A. M. Lea; the American Museum of Natural History), one male, one female, (A. M. Lea; South Australian Museum), one male, one female.

DISTRIBUTION: Fiji Islands.

TYPE: Male, Bernice P. Bishop Museum.

Ploiaria concolor (Dohrn), new combination

Luteva concolor DOHRN, 1860, p. 243, figs. 25, 28.

DISTRIBUTION: Celebes.

TYPE: Unknown.

Ploiaria congoana (Villiers), new combination

Culicimimus congoanus VILLIERS, 1949a, p. 316, fig. 139.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Male, Musée Royal de l'Afrique Centrale.

Ploiaria cunnamulla Wygodzinsky

Figures 2B; 45C

Ploiaria cunnamulla WYGODZINSKY, 1956, p. 216, figs. 169–176.

The foreleg and forewing of the species are illustrated here.

DISTRIBUTION: Australia (Queensland).

TYPE: Male, Australian Museum.

Ploiaria darlingtoni Wygodzinsky

Figure 46G, H

Ploiaria darlingtoni WYGODZINSKY, 1954b, p. 305, figs. 50–56.

The head and thorax of this micropterous insect are illustrated here.

DISTRIBUTION: Cuba.

TYPE: Male, Museum of Comparative Zoölogy.

Ploiaria decorata Villiers

Ploearia decorata VILLIERS, 1950, p. 105, figs. 12, 13.

DISTRIBUTION: Angola.

TYPE: Museu do Dundo.

Ploiaria denieri Wygodzinsky

Figure 49W

Ploiaria denieri WYGODZINSKY, 1954b, p. 307, figs. 57–62.

The original drawing of the head and pronotum of the micropterous female is here reproduced.

DISTRIBUTION: Bolivia.

TYPE: Female, Museo de La Plata.

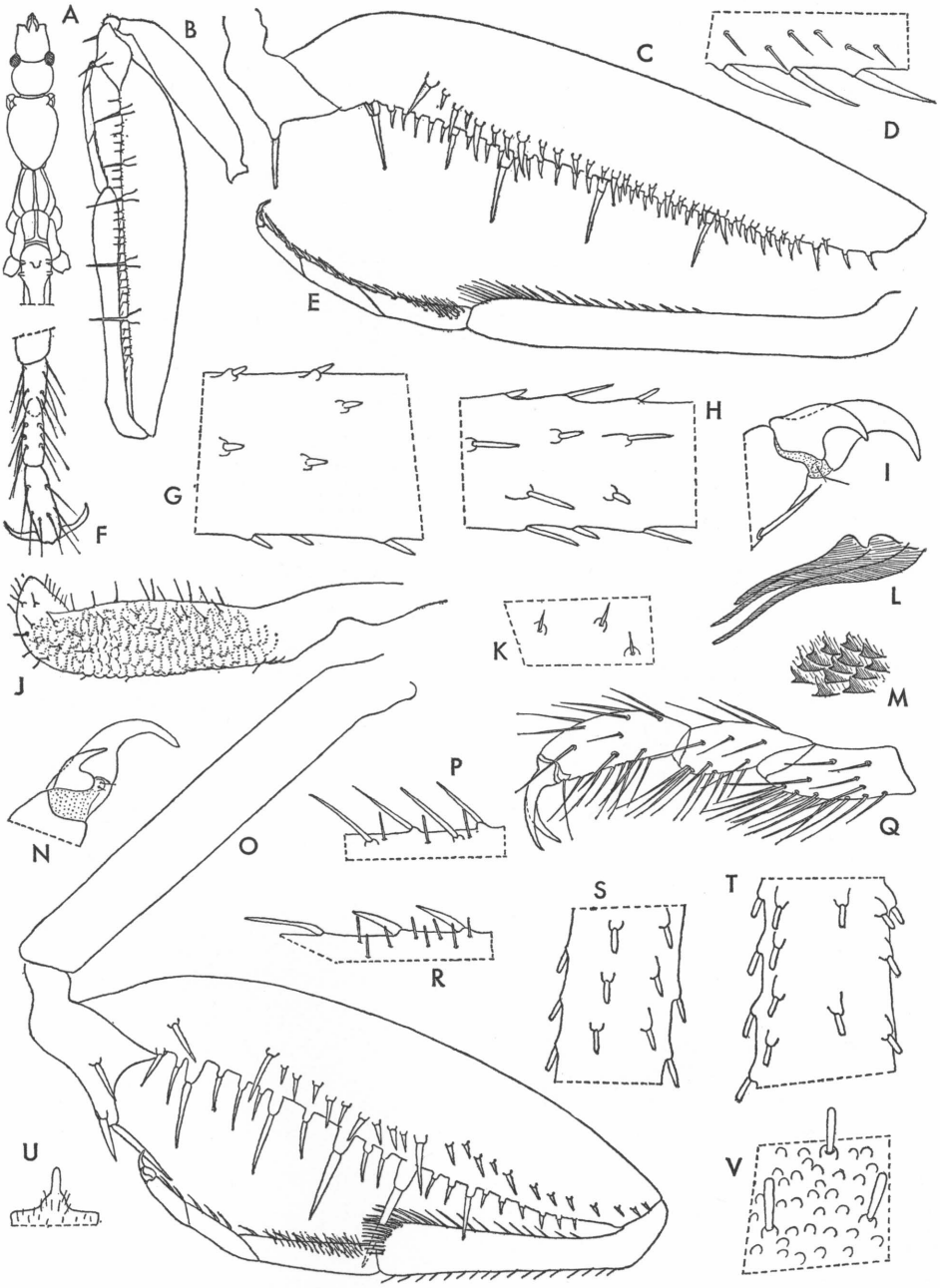


FIG. 50. A–M. *Ploiaria chilensis*, male. A. Anterior portion of body, dorsal view. B. Foreleg. C. Trochanter and fore femur. D. Spines of under surface of center of fore tibia. E. Tibia and tarsus of foreleg. F. Posterior tarsus, seen from below. G. Portion of hind femur. H. Portion of hind tibia. I. Praetarsus and claws of foreleg. J. Paramere. K. Setae of surface of abdominal sternite. L, M. Spines of endosoma, high magnification. N–V. *Ploiaria denticauda*. N. Praetarsus and claws of foreleg. O. Foreleg. P. Spines of under surface of fore tibia. Q. Hind tarsus. R. Spines of under surface of apex of first tarsal segment of foreleg. S. Portion of hind tibia. T. Portion of hind femur. U. Process of pygophore, high magnification. V. Detail of structure of abdominal sternite.

Ploiaria denticauda McAtee and Malloch

Figure 50N–V

Ploiaria denticauda McAtee and Malloch, 1925, p. 63, figs. 85–89.

Some details of the morphology of *denticauda* are illustrated here. The structure of the forelegs is similar to that of *macrophthalma*. The phallus of *denticauda*, not figured, is almost identical in structure with that of *macrophthalma* (see fig. 56N).

Distribution: United States (California, Arizona, Texas).

Type: Male, United States National Museum.

Ploiaria djurdjurana Dispons

Ploearia djurdjurana Dispons, 1951, p. 169, figs. 1–5.

Distribution: Algeria.

Type: Unknown.

Ploiaria domestica Scopoli

Figure 51A–Y

Ploiaria domestica Scopoli, 1786 (1786–1788, vol. 1), p. 60, pl. 24, figs. A, 1, 2; 1786 (1786–1788, vol. 2), pl. 23, figs. 1–14.

Emesodema domestica: Spinola, 1840, p. 87.

Cerascopus domesticus: Stål, 1874, p. 95.

Cerascopus marginatus Heineken, 1830, p. 36, pl. 2, fig. 5.

This is the type species of the genus; it is here illustrated in detail. The claws of the forelegs are subequal in size; the mid and hind tarsi are characterized by the very short second segment; their chaetotaxy is simple, as are the claws. The phallus is figured here for the first time (fig. 51N, O, R). The phallosoma is very slender and the endosoma asymmetrical: in addition to the usual minute spinulets, there are two unequal series of projections, one composed of larger, the other of smaller, elements. In the female, the gonocoxites are covered by the seventh sternite for their greater part; the syngonapophysis is conspicuous (fig. 51U, Y).

China (1938) has shown that *Cerascopus marginatus* is a synonym of *Ploiaria domestica*, but Dispons and Stichel (1959) maintained *Ploiaria marginata* as a valid species.

Distribution: Central and southern Europe; Near East to Turkestan; North Africa; Azores Islands; Madeira Islands.

Type: Unknown.

Ploiaria elegantula Villiers

Ploearia elegantula Villiers, 1952c, p. 35, fig. 23.

Distribution: Angola.

Type: Male, Muséum National d'Histoire Naturelle.

Ploiaria ellenbergeri Villiers

Ploearia ellenbergeri Villiers, 1948, p. 445, figs. 861–864 (figs. only).

Ploearia ellenbergeri: Villiers, 1949a, p. 311, figs. 124–127 (description and figures).

Wygodzinsky (1958a) illustrated the previously undescribed forewing of the species.

Distribution: South Africa (Orange Free State); Basutoland.

Type: Male, Muséum National d'Histoire Naturelle.

Ploiaria fairmairei (Dohrn)

Emesodema fairmairei Dohrn, 1860, p. 248.

Ploearia fairmairei: Lethierry and Severin, 1896, p. 74.

Distribution: West Indies.

Type: Unknown.

Ploiaria floridana (Bergroth)

Luteva floridana Bergroth, 1922a, p. 218.

Ploiaria floridana: McAtee and Malloch, 1925, p. 59, figs. 76.

Distribution: United States (Florida).

Type: The California Academy of Sciences.

Ploiaria funebris (Bergroth), new combination

Luteva funebris Bergroth, 1906a, p. 310.

Distribution: Borneo.

Type: Unknown.

Ploiaria gabonensis (Villiers), new combination

Culicimimus gabonensis Villiers, 1948, p. 447, figs. 867–868.

Distribution: Gabon; Congo (Léopoldville).

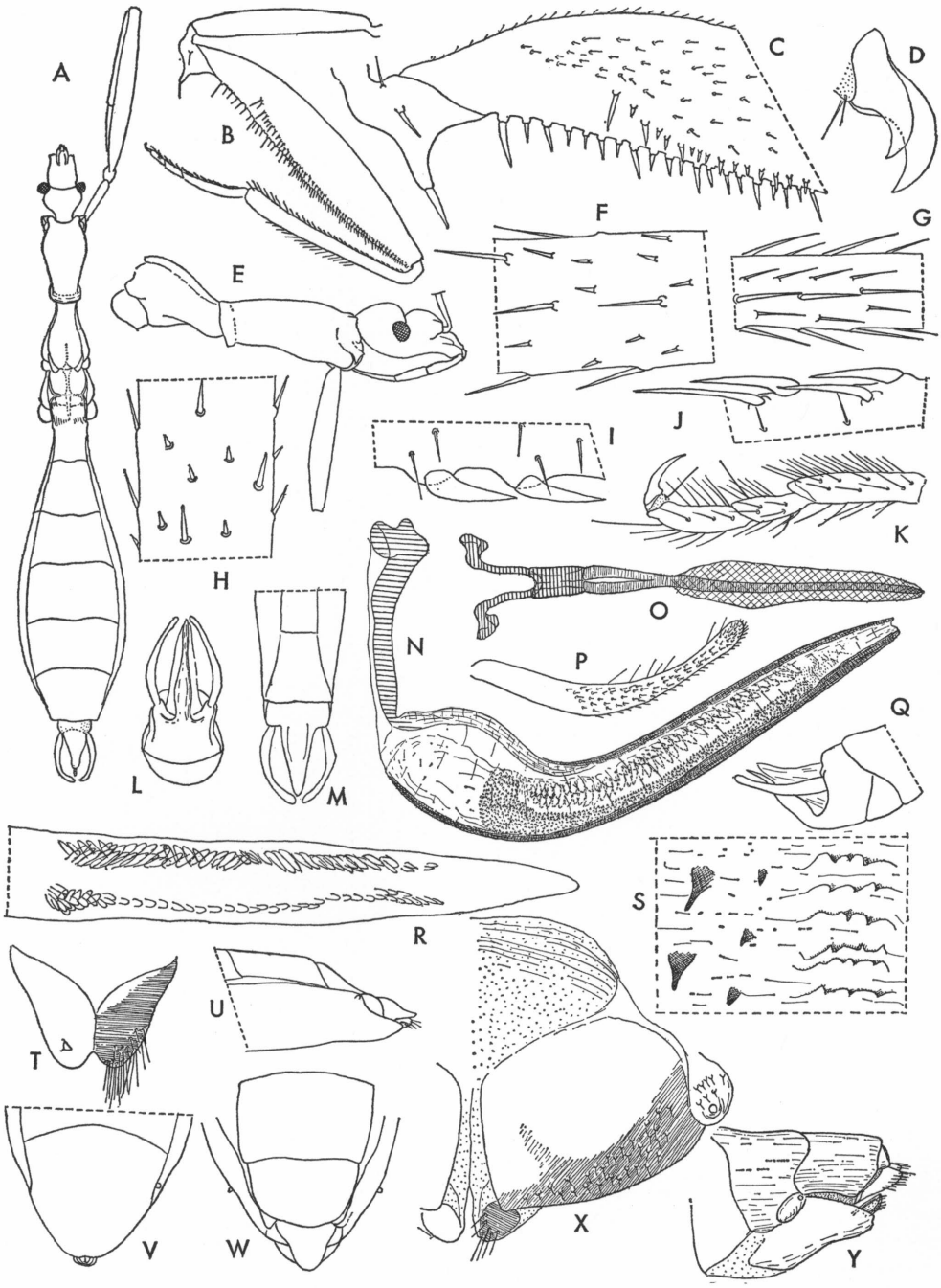
Type: Male, Muséum National d'Histoire Naturelle.

Ploiaria geijskesi Wygodzinsky

Figure 49U

Ploiaria geijskesi Wygodzinsky, 1945b, p. 244, figs. 1–3.

The species is characterized by its extraordinarily large eyes (fig. 49U).


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y

DISTRIBUTION: Surinam.

TYPE: Female, Instituto Oswaldo Cruz.

Ploiaria geniculata (Stål)

Figure 47C, G

Cerascopus geniculatus STÅL, 1874, p. 95.

Ploearia geniculata: LETHIERRY AND SEVERIN, 1896, p. 74.

MATERIAL EXAMINED: Australia: Geelong River (H. W. Davey; Australian Museum), one female; New South Wales: Branxton (Hungarian National Museum), two males; near Gunnedah (Hungarian National Museum), one male.

Wygodzinsky (1956) has discussed this species and given several illustrations, some of which are here reproduced.

DISTRIBUTION: Australia (New South Wales; Victoria).

TYPE: Female, Naturhistoriska Riksmuseet.

Ploiaria glabella, new species

Figure 52A–R

DESCRIPTION: Apterous male: Length, 13 mm. General aspect as shown in figure 52A.

Head and body castaneous to piceous, variegated with ochraceous and stramineous. Basal half of first rostral segment castaneous, remainder of rostrum ochraceous to stramineous. Antennae ochraceous, first segment with one subapical whitish annulus, apex piceous. Forelegs stramineous, spotted and annulated with piceous (fig. 52C). Coxae and trochantera of mid and hind legs ochraceous; femora piceous, with five narrow, equally spaced, light-colored annuli (fig. 52K), first and last annuli faint, ochraceous, three median annuli flavous; base and apex of segment dark. Tibiae ochraceous, their base piceous, followed by a narrow, subbasal, flavous annulus. Body and appendages slightly shining; head and body microscopically rugose. Pubescence very short and sparse, hardly perceptible.

Head and rostrum as shown in figure 52A, B. Eyes very small, interocular distance dorsally three times as large as width of eye; eyes remote from level of dorsal and ventral surface of head in lateral aspect. Antennae with sparse short hairs. Length of first segment, 8.8 mm.; relative length of segments, 1/0.85/0.2/0.23.

Thorax as shown in figure 52A, B. Pronotum almost four times as long as maximum width, gradually narrowed posteriorly; posterior lobe short but distinct. Fore lobe with a delicate, median, longitudinal, impressed line, surface of disc microscopically reticulate; hind lobe transversely rugose. Mesonotum slightly more than half as long as pronotum, more than twice as long as wide; metanotum more than half as long as mesonotum, slightly longer than wide; mesonotum and metanotum combined almost as long as pronotum. Mesonotum and metanotum with a delicate, median, longitudinal impression, incomplete on anterior portion of mesonotum.

Forelegs stout (fig. 52C). Coxa as long as prothorax. Trochanter glabrous. Femur seven times as long as maximum width. Ventral series composed of medium-sized and small, spinelike setae inserted on short, wartlike tubercles; none of setae attaining length of diameter of segment. Posteroventral series consisting of approximately 50 setae, those at base of series longest, forming a small cluster. Anteroventral series composed of about 45 setae, widely interupted at base (fig. 52G), one or two setae basad of interruption. Tibia half as long as femur, its under surface with two rows of short, adpressed spines (fig. 52D). Tarsus seven-tenths as long as tibia; basal segment more than twice as long as second and third combined, latter subequal. Under surface of basal segments

FIG. 51 (OPPOSITE PAGE). *Ploiaria domestica.* A. General aspect of male. B. Foreleg. C. Trochanter and base of fore femur. D. Claws of foreleg. E. Anterior portion of body of female, lateral view. F. Detail of basal portion of hind tibia. G. Detail of apical portion of hind tibia. H. Portion of posterior femur. I. Spines of under surface of fore tibia. J. Spines of under surface of apex of first segment of anterior tarsus. K. Posterior tarsus. L. Pygophore, seen from behind. M. Genital region of male, dorsal view. N. Phallus, lateral aspect. O. Articulatory apparatus and struts. P. Paramere. Q. Genital region of male, lateral view. R. Invaginated endosoma, as seen through phallosoma from above. S. Detail of surface of evaginated endosoma. T. Syngonapophysis. U. Genital region of female, side view. V. Apex of abdomen of female, ventral aspect. W. Apex of abdomen of female, seen from above. X. Gonocoxites with gonapophysis. Y. Genital region of female, lateral aspect, seventh sternite removed.

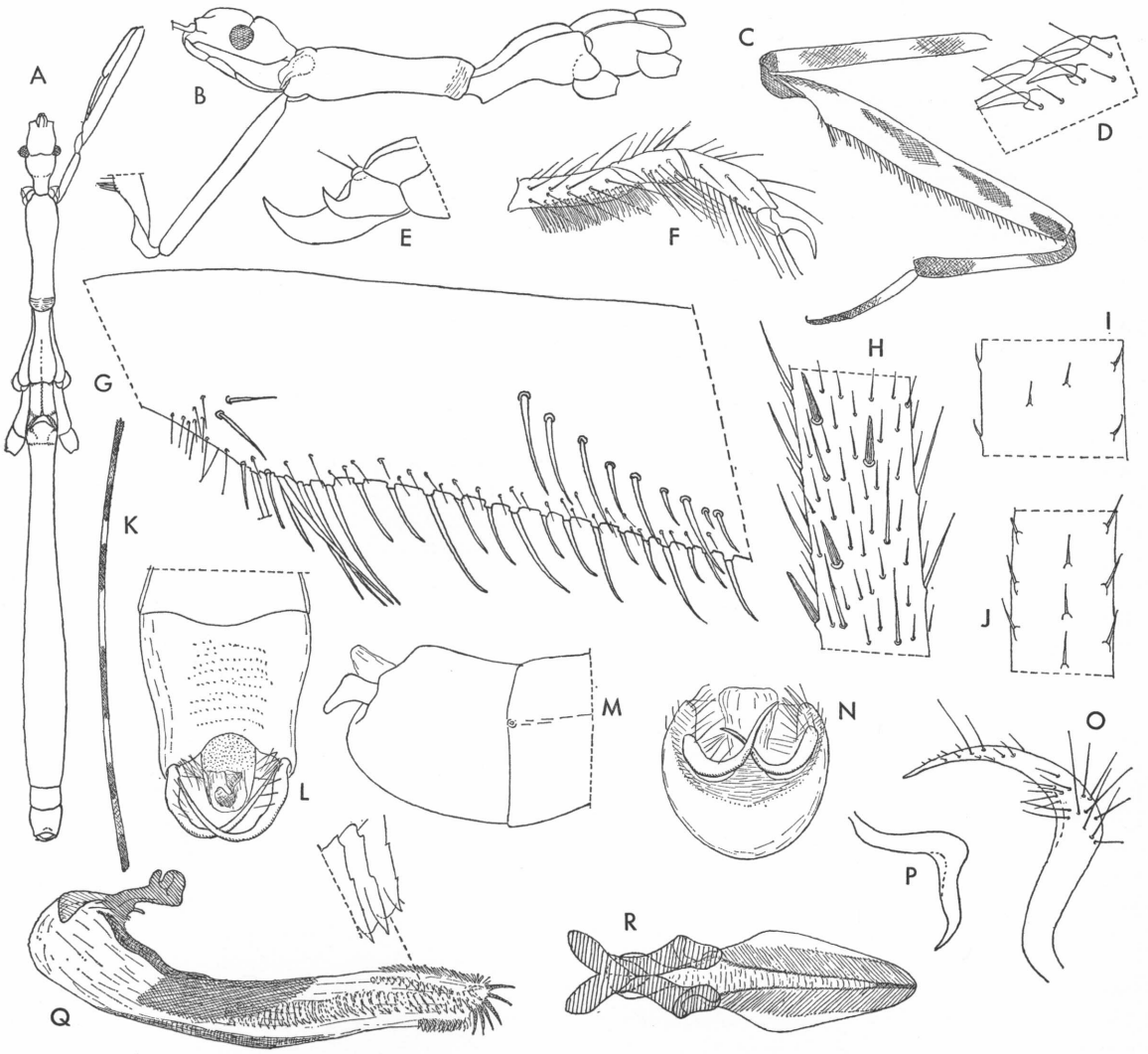


FIG. 52. *Ploiaria glabella*, male. A. General aspect. B. Anterior portion of body, lateral view. C. Foreleg with color pattern. D. Spines of under surface of fore tibia. E. Praetarsus and claws of foreleg. F. Posterior tarsus. G. Base of fore femur. H. Detail of apical portion of hind tibia. I. Detail of posterior femur. J. Detail of basal portion of hind tibia. K. Femur of second pair of legs, with color pattern. L. Pygophore, seen from above. M. Genital region, side view. N. Pygophore with parameres, posterior aspect. O. Paramere. P. Paramere, different view; setae not shown. Q. Phallus, lateral view; some spines of endosoma with high magnification. R. Articulatory apparatus and struts.

with one slightly irregular row of spines similar to those of tibia. Two claws, outer one much longer than inner. Posterior femur surpassing apex of abdomen by 5 mm. Mid and hind femur with sparse, short hairs (fig. 52I); setae of basal portion of tibia sparse (fig. 52J), becoming progressively more numerous toward apical portion of article, consisting of microchaetae and macrochaetae and also a certain number of short, strongly pigmented, spinelike setae (fig. 52H). First tarsal segment longest, second half as long, third three-fourths as long as first. Setae of under surface of second and third segments long, not numerous, those of first short, very numerous, not widened apically, forming elongate, brushlike structure (fig. 52F). Claws slender, simple.

Abdomen very slender, almost parallel-sided. Setae of sternites and tergites very sparse, of uniform size. Eighth sternite and tergite both well developed, entirely exposed. Pygophore large, occupying one-sixth of total length of abdomen, its shape as shown in figure 52A, L–N, its posterior border at center with a very short, triangular salience covered by parameres. The latter transverse, strongly curved, overlapping, their shape and chaetotaxy as shown in figure 52 O, P. Phallus as shown in figure 52Q, R. Articulatory apparatus with 1+1 posterior projections extending over base of phallobase. Sclerite formed by fused struts fused with dorsal sclerotization of phallobase. Dorsal and ventral sclerotizations of phallosoma developed, lateral walls also partly sclerotized. Endosoma asymmetrical, with one elongate row of large, and one short row of small, toothlike projections, as well as one apical group of numerous small teeth.

MATERIAL EXAMINED: New Caledonia: Forêt de Thy, March 1, 1960, 550 meters (J. L. Gressitt; Bernice P. Bishop Museum), one male holotype; Thi River Valley, November 8, 1940 (the American Museum of Natural History), one male paratype.

OBSERVATIONS: This new species can be compared to *Ploiaria phyllodoce* Wygodzinsky and Usinger. The main differences are indicated in the key.

There is at least one undescribed species of *Ploiaria* on New Caledonia which is very similar to *glabella* and can be distinguished by only minor characters.

Ploiaria granulata McAtee and Malloch

Figure 46D

Ploiaria granulata MCATEE AND MALLOCH, 1925, p. 57.

Only the female of this species is known. The authors of the species believed that it might eventually turn out to be the female of *megalops*, which is known only from the male.

The characteristic color pattern of the femoral-tibial articulation is illustrated here.

DISTRIBUTION: Guatemala; Mexico.

TYPE: Female, United States National Museum.

Ploiaria greeni Distant

Ploearia greeni DISTANT, 1903e, p. 209, fig. 148.
Luteva greeni: BERGROTH, 1915, p. 111.

Bergroth (1915) considered this species to be based on a nymph, probably of *Luteva malayana*.

DISTRIBUTION: Ceylon.

TYPE: British Museum (Natural History).

Ploiaria gundlachi (Dohrn)

Luteva gundlachi DOHRN, 1860, p. 244, fig. 19.
Ploiaria gundlachi: BARBER, 1923, p. 13.

DISTRIBUTION: Cuba; Grenada; Puerto Rico; French Guiana.

TYPE: Unknown.

Ploiaria guttata Wygodzinsky

Figures 45D–F, H

Ploiaria guttata WYGODZINSKY, 1956, p. 218, figs. 186–191.

Several of the original illustrations are here reproduced.

DISTRIBUTION: Australia (New South Wales).

TYPE: Female, Museum Zoologicum Universitatis.

Ploiaria gutturalis Noualhier

Ploiaria gutturalis NOUALHIER, 1895, p. 167, pl. 1, fig. 2.

Villiers (1943) gave useful figures of the species.

DISTRIBUTION: Algeria; Tunisia; Egypt.

TYPE: Muséum National d'Histoire Naturelle.

Ploiaria halosydne Wygodzinsky and Usinger

Figure 47S, V, X–Z

Ploiaria halosydne WYGODZINSKY AND USINGER, 1960, p. 235, figs. 1a–1m.

Several of the original figures are here reproduced.

DISTRIBUTION: Palau Islands.

TYPE: Male, Bernice P. Bishop Museum.

Ploiaria hewitti China

Ploiaria hewitti CHINA, 1925, p. 270, figs. A–C.

DISTRIBUTION: South Africa (Cape Province).

TYPE: British Museum (Natural History).

Ploiaria hirticornis (Nathan Banks)

Ploiariopsis hirticornis NATHAN BANKS, 1909, p. 44.
Ploiaria carolina: NATHAN BANKS, 1909, p. 44 (*nec* Herrich-Schäffer).

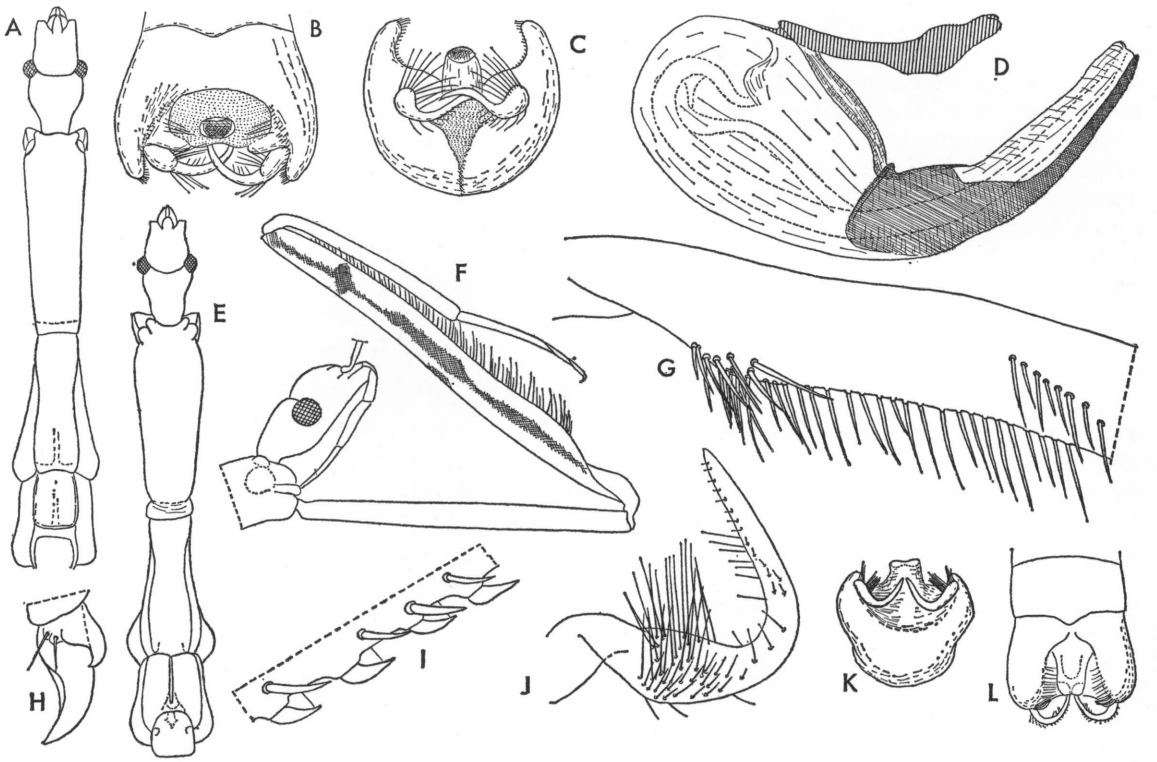


FIG. 53. A–D. *Ploiaria thetis*, male. A. Head and thorax, seen from above. B. Pygophore, dorsal aspect. C. Pygophore, seen from behind. D. Phallus, lateral view. E–L. *Ploiaria phyllodoce*, male. E. Head and thorax, seen from above. F. Anterior portion of body, side view. G. Base of fore femur. H. Praetarsus and claws of foreleg. I. Spines of under surface of fore tibia. J. Paramere. K. Pygophore, seen from behind. L. Pygophore, dorsal aspect.

Ploiaria hirticornis: McATEE AND MALLOCH, 1925, p. 64, figs. 90–92.

The anterior portion of the body is figured here in lateral aspect.

MATERIAL EXAMINED: United States: North Carolina: Greensboro, June 20, 21, 1956 (P. Ashlock; the American Museum of Natural History), one male, one female.

DISTRIBUTION: United States (District of Columbia; North Carolina; Florida).

TYPE: Male, Museum of Comparative Zoölogy.

Ploiaria icela Wygodzinsky

Figure 47D

Ploiaria icela WYGODZINSKY, 1958a, p. 124, figs. 37–47.

The anterior portion of the body is illustrated here.

DISTRIBUTION: South Africa (Cape Province).

TYPE: Male, Zoological Institute, University, Lund.

Ploiaria insolida (White)

Figure 45G, J, K

Luteva insolida WHITE, 1877, p. 113.

Ploiaria insolida: WYGODZINSKY AND USINGER, 1960, p. 235, fig. 1n.

Ploiaria (*Ploiaria*) *uniformis* McATEE AND MALLOCH, 1926, p. 142, fig. 45.

Ploiaria colleneti CHEESMAN, 1927, p. 95.

Luteva malayana DISTANT, 1903c, p. 258, pl. 16, figs. 2, 2a (new synonymy).

Ploiaria selangorensis MILLER, 1941, p. 776, figs. 2a–2d (new synonymy).

The original description of *Luteva malayana* (Distant, 1903c) was very short and almost meaningless, but Distant's accompanying illustration (pl. 16, fig. 2) was good and agreed very well with *Ploiaria insolida;* hence the above synonymy, which is not contradicted by any data in the description. The

same is true for Miller's *Ploiarias elangorensis*.

A detailed redescription can be found in China (1930). Some figures are given in the present paper to illustrate the species.

MATERIAL EXAMINED: *China:* Hongkong, 1908 (the University of Kansas), one male. *Philippines:* Manila, February 19, 1926 (R. G. McGregor; United States National Museum), one male. *Borneo:* North Borneo: Samarang, at light [British Museum (Natural History)], one specimen. *Moluccas:* Misool Island, Solal, September–October, 1948, 0 to 75 meters (M. A. Lieftinck; the American Museum of Natural History), one male; (M. A. Lieftinck; Museum Zoologicum Bogoriense), one female. *New Guinea:* Papua: Kokoda, April 1933, 1,200 feet [L. E. Cheesman; British Museum (Natural History)], one male.

DISTRIBUTION: China; Malaya; Philippines; Borneo; Moluccas; New Guinea; Micronesia; Marquesas; Samoa; Hawaiian Islands.

TYPES: Of *insolida*, unknown; of *uniformis*, female, United States National Museum; of *colleneti*, British Museum (Natural History); of *malayana*, British Museum (Natural History); of *selangorensis*, British Museum (Natural History).

Ploiaria isadas (Kirkaldy), new combination

Luteva isadas KIRKALDY, 1901, p. 56.

DISTRIBUTION: Sumatra.

TYPE: Rijksmuseum van Natuurlijke Historie.

Ploiaria jimmiwum, new species

Figure 54A–O

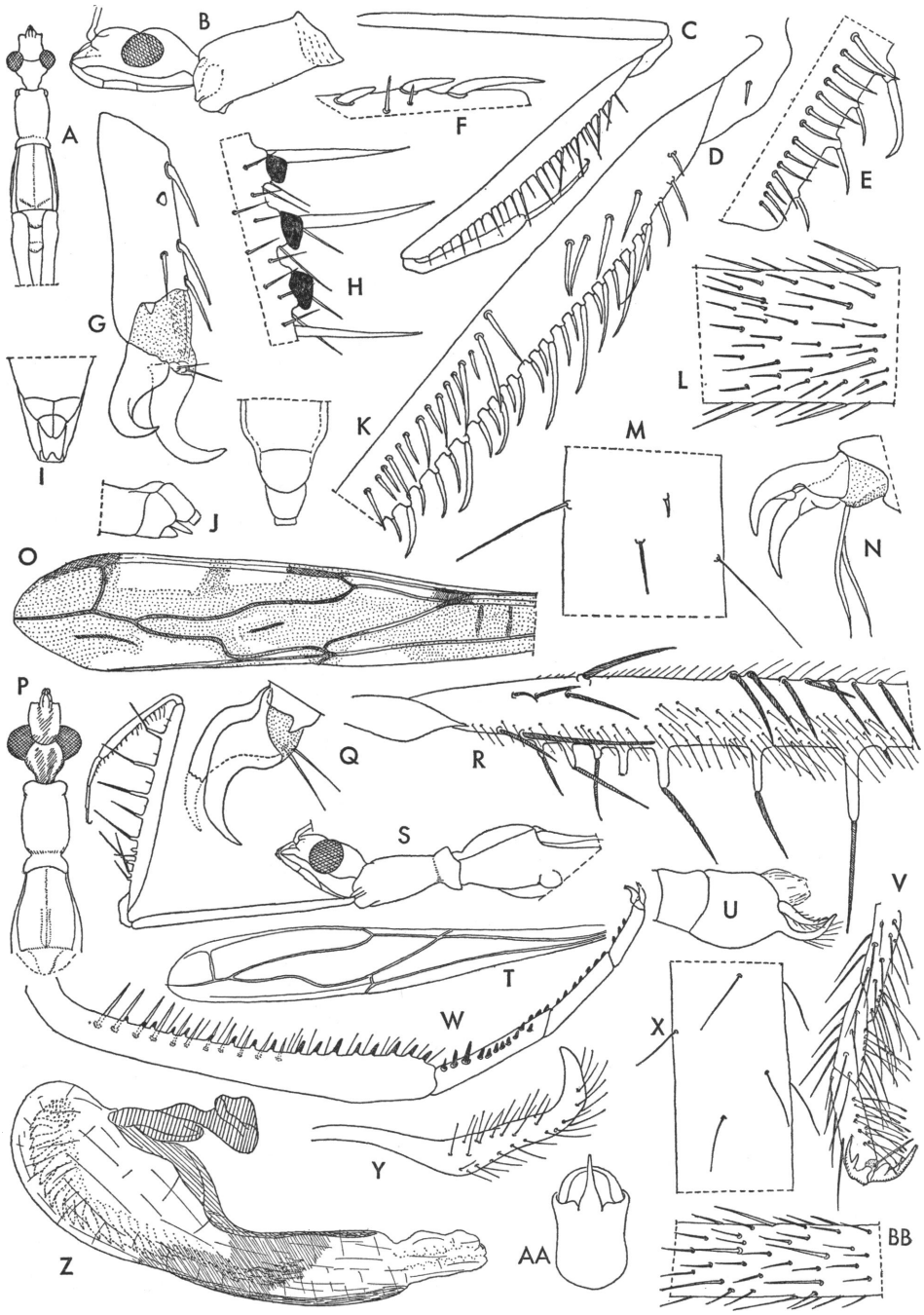
DESCRIPTION: Macropterous female: Length, 14 mm. General shape very slender.

General color ochraceous. Head and rostrum tinged with castaneous. First segment of antennae darkened basally, apex with a distinct, short, dark annulus, a short, subapical, whitish annulus; extreme apex of second segment white. Basal and apical third of fore coxa flavous; fore femur with three faint dark annuli: one subbasal, one median, and one subapical; tibia darkened on apical fourth. Femoral-tibial joint of mid and hind legs broadly white; femora with a wide, subapical, castaneous annulus. Forewings slightly iridescent, with rather faint pattern as shown in figure 54 O. Hind wings hyaline, iridescent, veins faintly darkened. Body surface smooth, slightly shining, pronotum more strongly so. Head, thorax, and abdomen with adpressed short pile, intermixed with isolated longer hairs.

Head as shown in figure 54A, B. Distance between eyes dorsally slightly larger than width of eye (1/0.8); in lateral view eye not attaining level of dorsal and ventral surfaces of head. Antennae with short pile. Length of first segment, 10 mm.; relative length of segments, 1/0.7/0.28/0.17.

Thorax as shown in figure 54A, B. Pronotum subcylindrical, approximately one and one-half times as long as wide; sides of fore lobe convex, widest at middle; hind lobe very short, but distinct. Mesonotum almost twice as long as wide, convex, median longitudinal furrow very shallow and narrow.

Forelegs slender (fig. 54C). Fore coxa slightly more than twice as long as pronotum. Trochanter with a few delicate hairs, its inner surface with a short, spiniform seta (fig. 54D). Femur 12 times as long as maximum width. Ventral series (fig. 54D, E) composed of strong but slender long spines inserted on conspicuous basal tubercles; some of the spines longer than diameter of segment. Posteroventral series beginning near base of article, composed of about 30 large and medium-sized spines. Anteroventral series beginning at identical level, consisting of from 30 to 35 spines similar to those of other series, interrupted at base, four to five spines basad of interruption. Fore tibia almost half as long as femur, stout, its under surface with one series of strong, hyaline, erect setae and one row of heavily sclerotized, beak-shaped teeth (fig. 54H). Fore tarsus three-fifths as long as tibia; first segment as long as second and third combined, second almost twice as long as third. Under surface of tarsus with one row of heavily sclerotized spines, those on basal portion of first segment (fig. 54F) similar to those of tibia, remainder slender, pointed, adpressed (fig. 54G). Two claws, subequal in size (fig. 54G). Posterior femur surpassing apex of abdomen by 2 mm. Mid and hind femur on basal half with sparse, very short, and isolated long hairs (fig. 54M); apical half of femora and the tibiae with numerous microchaetae and macrochaetae


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB

(fig. 54L). Structure and chaetotaxy of mid and hind tarsi like those of *P. maai* (see fig. 55 I); claws slender, with a submedian incision followed by a small rounded projection, empodial setae very stout (fig. 54N).

Forewings falling short of apex of abdomen by 1 mm. Venation as shown in figure 54 O. Vein limiting inner border of discal cell strongly bent at middle; vein limiting outer border of cell undulated; apical portion of discal cell very narrow. Venation of hind wing as usual; transverse thickening relatively narrow.

Genital region as shown in figure 54 I–K. Outlines of eighth tergite continuous with those of seventh; lateral portions of ninth large. Gonocoxites and gonapophyses largely exposed; syngonapophysis very conspicuous.

MATERIAL EXAMINED: New Guinea: Northeast New Guinea: Wum, upper Jimmi Valley, July 18, 1955, 840 meters (J. L. Gressitt; Bernice P. Bishop Museum), one female holotype.

OBSERVATIONS: The present species differs from all other Pacific *Ploiaria* with specialized hind tarsi and claws by the peculiar armature of the forelegs.

Ploiaria kocheri Dispons

Ploiaria kocheri DISPONS, 1963, p. 202, figs. 11–13.

DISTRIBUTION: Morocco.

TYPE: Unknown.

Ploiaria longiventris (Dohrn), new combination

Luteva longiventris DOHRN, 1863, p. 73.

This species clearly belongs to the "Elymas" group.

DISTRIBUTION: Unknown.

TYPE: Unknown.

Ploiaria maai, new species

Figure 55A–S, V, W, Z, AA

DESCRIPTION: Macropterous male and female: General shape slender (fig. 55F). Length of male, 14 mm.; of female, 15.0–15.5 mm.

General color fuscous to piceous; antennae and legs castaneous to fulvous. First rostral segment fuscous, second and third castaneous. Neck and a subbasal annulus of first antennal segment stramineous. Basal portion of fore coxa rather light-colored. Apex of fore femur broadly piceous, remainder of segment with two to three faintly darker regions; fore tibia piceous at base. Coxae and trochantera of mid and hind legs fulvous, conspicuously contrasting with piceous sterna; femora castaneous, becoming piceous toward apex; hind femora with wide, apical, white annulus. Mid and hind tibiae castaneous, with a wide, basal, white annulus, latter interrupted by a small dark spot, which is more distinctive on mid legs. Forewings semihyaline, veins dark brown, those limiting pterostigma whitish; area between veins brownish, iridescent, whitish near base and apex of pterostigma; center of areas between veins faintly clouded with darker. Hind wings hyaline, strongly iridescent, veins and transverse thickening fuliginous. Body surface smooth, slightly shining, head and pronotum more strongly so; pleural and sternal region of thorax polished. Pronotum and fore lobe of head glabrous; mesothorax and metathorax dorsally, and abdomen entirely, with short, adpressed, golden pubescence.

Head and rostrum as shown in figure 55E, F; distance between eyes dorsally slightly larger than width of eyes (1/0.8) in both sexes; in lateral view, eyes not attaining level

---

FIG. 54 (OPPOSITE PAGE). A–O. *Ploiaria jimmiwum*, female. A. Anterior portion of body, dorsal view. B. Head and prothorax, lateral aspect. C. Foreleg. D. Trochanter and basal half of fore femur. E. Detail of under surface of apical portion of fore femur. F. Spines of under surface of first tarsal segment of foreleg. G. Apical segment of fore tarsus, with claws. H. Detail of under surface of fore tibia. I. Genital region, ventral view. J. Apex of abdomen, lateral aspect. K. Genital region, seen from above. L. Portion of hind tibia. M. Portion of posterior femur. N. Praetarsus and claws of hind legs. O. Forewing, with color pattern. P–Z, AA, BB. *Ploiaria biroi*, male. P. Anterior portion of body, dorsal view. Q. Praetarsus and claws of foreleg. R. Trochanter and base of fore femur. S. Anterior portion of body, side view. T. Forewing. U. Genital segments, lateral view. V. Posterior tarsus. W. Tibia and tarsus of foreleg. X. Portion of hind femur. Y. Paramere. Z. Phallus, lateral view. AA. Pygophore, seen from behind. BB. Portion of hind tibia.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA

of dorsal or ventral surfaces of head. First and second segments of antennae of male with numerous hairs about five times as long as diameter of segment. Length of first segment of male, 11.5 mm.; relative length of segments, 1/0.8/0.22/0.15.

Thorax as shown in figure 55E, F. Pronotum subcylindrical, constricted on posterior half; hind lobe distinct, its disc smooth. Mesonotum almost twice as long as wide, convex, median longitudinal furrow very shallow and narrow.

Forelegs slender (fig. 55B). Coxa slightly shorter than pronotum. Trochanter with a few very fine hairs only. Fore femur 10 times as long as its maximum width, slightly S-shaped. Ventral series composed of slender, spinelike setae of medium and small size, inserted on very low tubercles (fig. 55A). Posteroventral series composed of about 70 setae, the largest ones situated on basal half of segment. Anteroventral series consisting of about 50 setae, widely interrupted at base, a single seta basad of interruption. Tibia half as long as femur, its lower surface with two series of strongly sclerotized, adpressed spinulets (fig. 55C). Tarsus three-fifths as long as tibia; basal segment twice as long as second and third combined, third slightly shorter than second; under surface with one to two irregular series of spinulets similar to those of tibia (fig. 55D). Two claws (fig. 55G), their sizes unequal but both well developed. Posterior femur surpassing apex of abdomen by approximately 5 mm. Basal half of femora with isolated very short and delicate hairs (fig. 55J); apical portion of femur, as well as tibia, with microchaetae and macrochaetae (fig. 55L). Segments of mid and hind tarsi of identical length; chaetotaxy as shown in figure 55 I, apical segment with a well-developed scopula, its component bristles decreasing in size from base to apex of segment. Claws slender, with an elongate, pointed, submedian process (fig. 55H, I).

Shape and venation of forewings as shown in figure 55F, falling short of apex of abdomen by about 2 mm. in both sexes. Apical portion of vein limiting inner border of discal cell conspicuously bent near apex of cell. Venation of hind wing as shown in figure 55K; transverse thickening narrow.

Abdomen slender, only very slightly narrowed toward base. Tergites and sternites with microchaetae and macrochaetae (fig. 55AA).

Male: Eighth sternite and tergite both well developed, entirely exposed (fig. 55N, S). Pygophore occupying one-tenth of total length of abdomen, its shape as shown in figure 55M, N, S; its posterosuperior margin with a short, pointed, central process (fig. 55P), covered by parameres. The latter transverse, overlapping (fig. 55M), long and slender, broadly curved, their chaetotaxy as shown in figure 55 O. Phallus as shown in figure 55Q. Phallobase largely membranous, dorsal and ventral sclerotizations narrow, band-shaped. Struts symmetrical. Endosoma with four asymmetrically arranged groups of toothlike processes.

Female: Genitalia as shown in figure 55R, V, W, Z. Limits between seventh and eighth tergites not distinct. Lateral portions of ninth tergite large. Gonocoxites and gonapophyses largely exposed; their shape, pigmentation, and chaetotaxy as illustrated.

MATERIAL EXAMINED: Bismarck Archipelago: Rossum, 6 kilometers southeast of Lorengau, December 23, 1959, 180 meters (T. C. Maa; Bernice P. Bishop Museum), one male holotype, one female allotype, two

FIG. 55 (OPPOSITE PAGE). A–S. *Ploiaria maai*. A. Basal half of fore femur. B. Foreleg. C. Spines of under surface of fore tibia. D. Spines of under surface of apex of first tarsal segment of foreleg. E. Head and prothorax of female, lateral aspect. F. General aspect of male. G. Praetarsus and claws of foreleg. H. Praetarsus of hind leg, with one claw. I. Hind tarsus. J. Portion of posterior femur. K. Hind wing. L. Portion of hind tibia. M. Pygophore, seen from behind. N. Genital segments of male, side view. O. Paramere, pigmentation shown. P. Apex of posterior border of pygophore, high magnification. Q. Phallus, lateral view; some spines of endosoma with high magnification. R. Syngonapophysis. S. Apex of abdomen of male, dorsal view. T, U. *Ploiaria circe*, male. T. Pygophore, seen from above. U. Detail of hind wing. V, W. *Ploiaria maai*, female. V. Gonocoxite with gonapophysis. W. Apex of abdomen, lateral view. X, Y. *Ploiaria circe*, male. X. Pygophore, seen from behind. Y. Genital region, lateral view. Z, AA. *Ploiaria maai*, female. Z. Apex of abdomen, seen from above. AA. Setae of abdominal sternite.

male and two female paratypes; (T. C. Maa; the American Museum of Natural History), one male, one female, paratypes.

OBSERVATIONS: This species, which is named for its collector, belongs to the "Elymas" group. It is distinguishable by the combination of its characters, which are shown in the key.

Ploiaria macrophthalma (Dohrn)

Figure 56A–O

Luteva macrophthalmus DOHRN, 1860, p. 244, figs. 23, 24.

Ploiaria macrophthalma: WYGODZINSKY, 1954b, p. 309.

Luteva insulicola KIRKALDY, 1908a, p. 196 (new synonymy).

Luteva malayana: DISTANT, 1910, p. 178, fig. 97 (*nec* Distant, 1903c, p. 258).

Luteva culicina BERGROTH, 1915, p. 109 (new synonymy).

Ploiaria bispina MCATEE AND MALLOCH, 1925, p. 59, fig. 77.

Ploiaria subaequalis MCATEE AND MALLOCH, 1926, p. 142, fig. 44 (new synonymy).

Luteva subaequalis: CHINA, 1930, p. 147.

Culicimimus brinae VILLIERS, 1949a, p. 316, figs. 137, 138 (new synonymy).

The wide range of this species, together with its lack of really striking characters, may have contributed to the large number of synonyms.

The description of *Luteva insulicola* from Hawaii is entirely in agreement with the characters of *macrophthalma;* the species is common in Hawaii, and numerous specimens have been examined during the course of the present work.

As already pointed out by Bergroth (1915), the species illustrated by Distant in two different papers (1903c, 1910) as *Luteva malayana* does not refer to one and the same taxon. The later description agrees well with that of *macrophthalma.* The true *malayana* (Distant, 1903c) is now synonymized with *Ploiaria insolida.*

The description of *Luteva culicina* contains no elements that would allow its separation from *macrophthalma.* Specimens belonging to the Helsinki Museum, probably part of the type series, which I have examined, agree fully with the description of *culicina* but are without doubt identical with *macrophthalma;* hence the above synonymy.

The male holotype of *Ploiaria subaequalis* has been examined; it agrees completely with *macrophthalma.*

The examination of the Cameroon specimens mentioned below showed that similar insects have been described by Villiers (1949a) as *Culicimimus brinae.* On the other hand there is nothing to distinguish these specimens from *macrophthalma.* Under these circumstances the above synonymy seems justified.

It has been thought of interest to illustrate some morphological details of this species in order to facilitate its identification. The structure of the forelegs is shown in figure 56D–F; the very small inner claw is noteworthy (fig. 56E). The chaetotaxy of the mid and hind femora and tibiae is shown in figure 56H, I; the proportions of the tarsal segments are as shown in figure 56G; the setae of the tarsi are simple, as are the claws. The structure of the male genitalia is illustrated in figure 56J–M; the phallus is characterized by a group of serial chitinized folds in the phallosoma posterior to the base of the struts. The endosoma is symmetrical; it shows 1+1 rows of folds resembling spines, 1+1 rows of strongly chitinized small, and one large median row of more weakly sclerotized, spinelike, processes.

MATERIAL EXAMINED: *Guatemala:* Morales, September, 1929 (J. J. White; United States National Museum), one male, from Lutz collection. *Panama:* Sabanas, April 16, 1923 (R. C. Shannon; United States National Museum), three males. *Colombia:* (United States National Museum), one male, intercepted at District of Columbia, on wild orchid, April 8, 1937. *Brazil:* Bahia, house (Davis and Shannon; United States National Museum), one male. *Hawaiian Islands:* Honolulu (collection Usinger), four males, one female. *Tahiti:* Papeete, December 17, 1924 (J. M. Clements; United States National Museum), one male. *Australia:* Queensland: Kuranda (P. P. Dodd; South Australian Museum), one male. *Java:* Preanger (Zoologisch Museum), one male; Batavia, 1908 (Jacobson: Rijksmuseum van Natuurlijke Historie), one specimen; Samarang, November, 1909 (E. Jacobson; Museum Zoologicum Universitatis), two males. *Sumatra:* Fort de Kock, October, 1913 (E. Jacobson; Rijks-

museum van Natuurlijke Historie), one female, one specimen; Fort de Kock, 1926, 920 meters (Jacobson; Rijksmuseum van Natuurlijke Historie), one male. *Ceylon:* July, 1910 (Museum Zoologicum Universitatis), one male [this may be the specimen examined by Distant, 1910]. *Cameroon:* Lolodorf (A. J. Good; Carnegie Museum), two males.

DISTRIBUTION: Neotropical Region (Mexico; Guatemala; Panama; Cuba; Venezuela; Colombia; British Guiana; Brazil); Australia; Oriental Region (Hawaiian Islands; Tahiti; Java; Sumatra; Philippines; Ceylon); Ethiopian Region (Congo [Léopoldville]; Cameroon).

TYPES: Of *macrophthalma*, Naturhistorisches Museum, Vienna; of *insulicola*, unknown; of *culicina*, Museum Zoologicum Universitatis; of *bispina*, male, United States National Museum; of *subaequalis*, male, United States National Museum; of *brinae*, male, Musée Royal de l'Afrique Centrale.

Ploiaria maria Maldonado

Figure 49X–Z

Ploiaria (*Luteva*) *maria* MALDONADO, 1948, p. 20, figs. 4–6, 13.

There is a scopula on the third tarsal segment of the mid and hind legs, as shown in figure 49Z, but the claws are simple. The characteristic apical bristle tufts of the pygophore, also present in related Puerto Rican species, are illustrated in figure 49X, Y.

DISTRIBUTION: Puerto Rico.

TYPE: Male, United States National Museum.

Ploiaria maya, new species

Figure 56P–Z, AA–EE

DESCRIPTION: Macropterous male: Length, 8 mm. General shape slender, antennae and legs extremely elongate.

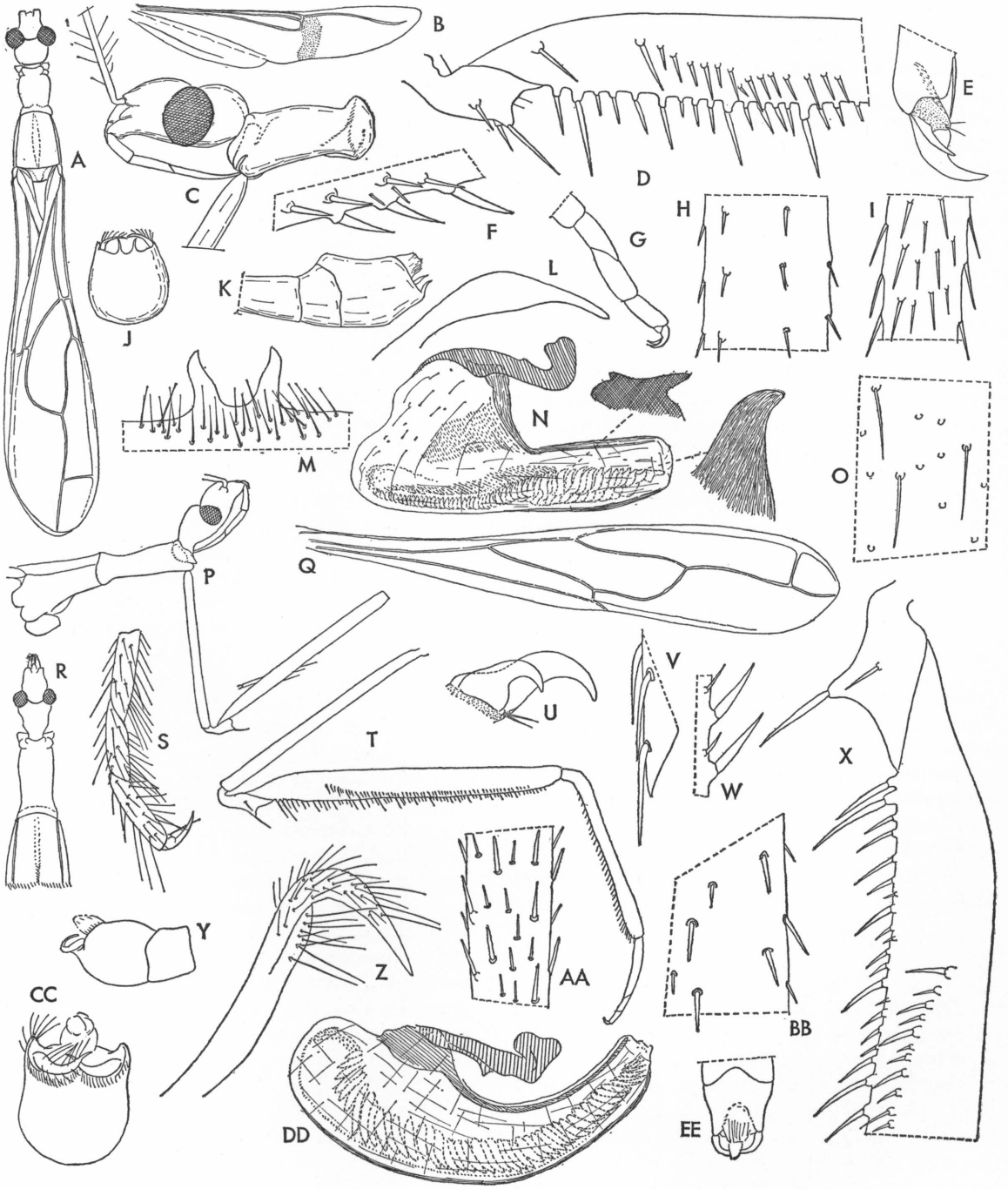
General color stramineous; antennae and mid and hind legs ochraceous, mid and hind femora apically, and respective tibiae, white basally. Body surface slightly shining, minutely rugose. Pubescence very short and inconspicuous.

Head and rostrum as shown in figure 56P, R. Distance between eyes dorsally slightly larger than their width (1/0.85); eyes not attaining level of dorsal or ventral surfaces of head in lateral view. First and second antennal segments with sparse long hairs, those of first segment three times as long as diameter of segment, those of second equal to diameter. Length of first segment, 10.5 mm. (longer than length of insect); relative length of segments, 1/0.75/0.31/0.19.

Thorax as shown in figure 56P, R. Pronotum subcylindrical, slightly constricted on posterior fourth; hind lobe very short, not clearly distinguishable. Mesonotum about as long as pronotum, median longitudinal depression poorly developed.

Forelegs very slender (fig. 56P, T). Coxa as long as prothorax and mesothorax combined, distinctly longer than tibia (1.3/1). Trochanter with a conspicuous ventral projection bearing a strong, spinelike seta, a shorter and more slender, spinelike seta on inner surface of trochanter. Femur 12 times as long as maximum width. Ventral series (fig. 56X) consisting of medium-sized and short, spinelike setae inserted on short, wartlike protuberances; none of setae attaining length of diameter of segment. Posteroventral series composed of approximately 60 setae, longest at base of series. Anteroventral series not interrupted at base, composed of about 50 setae. Tibia slightly longer than half of length of femur, its ventral surface with one series of inclined short spines, accompanied by a series of similar but minute spines (fig. 56W). Tarsus half as long as tibia; first segment twice as long as second and third combined, latter subequal in size; under surface of tarsus with one to two irregular series of adpressed, slender spines (fig. 56V). Two claws, subequal in size (fig. 56U). Posterior femora surpassing apex of forewings by 6 mm., their total length, 12 mm., that of posterior tibiae, 20 mm. Mid and hind femora and tibia with microchaetae and macrochaetae of inconspicuously different sizes (fig. 56AA, BB), those of femora less numerous than those of tibia. First and third tarsal segments subequal in size, second slightly shorter, setae simple; claws slender, simple (fig. 56S).

Forewings surpassing apex of abdomen by 1 mm., their shape and venation as shown in figure 56Q. Discal cell slightly more than four times as long as its greatest width, the veins


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE

limiting it simply curved. Hind wings without special characters.

Abdomen slender, parallel-sided. Tergites and sternites with microchaetae and macrochaetae. Eighth sternite and tergite both completely exposed (fig. 56Y). Pygophore one-seventh of total length of abdomen, its posterior border with a short, triangular, median projection covered by parameres. Latter transverse, overlapping (fig. 56CC), their shape and chaetotaxy as shown in figure 56Z. Phallus symmetrical. Phallobase membranous, dorsal and ventral sclerotization band-shaped. Endosoma with 1+1 rows of large, spinelike processes (fig. 56DD).

MATERIAL EXAMINED: Mexico: cave in Yucatan, 1926 (A. S. Pearse; United States National Museum), one male holotype.

OBSERVATIONS: This species is very closely related to the similarly cave-inhabiting *P. umbrarum* from Jamaica. The characters given in the key seem sufficient to separate the two species.

Ploiaria media McAtee and Malloch

Ploiaria (Luteva) media MCATEE AND MALLOCH, 1925, p. 144, fig. 51.

DISTRIBUTION: Philippines.

TYPE: Male, United States National Museum.

Ploiaria megalops (Champion)

Ploiariopsis megalops CHAMPION, 1898a, p. 174, pl. 10, figs. 21, 21a.

Ploiaria megalops: MCATEE AND MALLOCH, 1925, p. 52.

McAtee and Malloch (1925) compared this species, which they had not seen, to their *granulata*, but the species is obviously more similar to their *hirticornis* and *denticauda*. It has not been included in the key.

DISTRIBUTION: Panama.

TYPE: Male, British Museum (Natural History).

Ploiaria mellea McAtee and Malloch

Ploiaria (Luteva) mellea MCATEE AND MALLOCH, 1926, p. 143.

DISTRIBUTION: Philippines.

TYPE: Female, United States National Museum.

Ploiaria mimeuri Villiers

Ploearia mimeuri VILLIERS, 1943, p. 92, figs. 7, 11.

DISTRIBUTION: Morocco.

TYPE: Female, Muséum National d'Histoire Naturelle.

Ploiaria modesta Montrouzier

Ploiaria modesta MONTROUZIER, 1864, p. 240.

Lethierry and Severin (1896) listed this species as being of unknown affinities. Its description, however, fits the genus *Ploiaria* quite well, and I have no doubt about placing it here.

DISTRIBUTION: New Caledonia.

TYPE: Unknown.

Ploiaria montivaga Dispons

Ploiaria montivaga DISPONS, 1963, p. 200, figs. 7–9.

DISTRIBUTION: Morocco.

TYPE: Unknown.

Ploiaria mosconai Wygodzinsky

Figures 10C–E; 47E, F

Ploiaria mosconai WYGODZINSKY, 1952a, p. 103, figs. 11–20.

Some of the original figures are reproduced here.

Dispons and Stichel (1959) erroneously reported the species from Syria, but it is known only from Israel.

FIG. 56 (OPPOSITE PAGE). A–O. *Ploiaria macrophthalma*, male. A. General aspect. B. Hind wing. C. Head and prothorax, lateral view. D. Trochanter and base of fore femur. E. Praetarsus and claws of foreleg. F. Spines of under surface of fore tibia. G. Outline of hind tarsus with claws. H. Portion of hind femur. I. Portion of hind tibia. J. Pygophore, posterior view. K. Apex of abdomen, lateral aspect. L. Outline of paramere. M. Posterior process of pygophore, high magnification. N. Phallus, lateral view; some spines of endosoma with high magnification. O. Detail of surface of abdominal sternite. P–Z, AA–EE. *Ploiaria maya*, male. P. Anterior portion of body, side view. Q. Forewing. R. Head and thorax, dorsal aspect. S. Hind tarsus. T. Foreleg. U. Claws of fore tarsus. V. Spines of under surface of apical portion of first tarsal segment of foreleg. W. Spines of under surface of fore tibia. X. Trochanter and base of fore femur. Y. Genital segments, lateral aspect. Z. Paramere. AA. Portion of hind tibia. BB. Detail of hind femur. CC. Pygophore, seen from behind. DD. Phallus, lateral aspect. EE. Genital segment, seen from above.

DISTRIBUTION: Israel.
TYPE: Male, Hebrew University.

Ploiaria moshesh Wygodzinsky

Figure 47H, J, N

Ploiaria moshesh WYGODZINSKY, 1958a, p. 127, figs. 48–57.

Some characters of this species are here illustrated.
DISTRIBUTION: South Africa (Cape Province).
TYPE: Male, Zoological Institute, University, Lund.

Ploiaria musgravei Wygodzinsky

Figure 45L, M, P, Q

Ploiaria musgravei WYGODZINSKY, 1956, p. 219, figs. 192–202.

Some of the original drawings are here reproduced.
MATERIAL EXAMINED: Australia: South Queensland; Obi-Obi River, Blackall Range, May 20, 1951 (W. L. Brown; South Australian Museum), one female.
DISTRIBUTION: Australia (New South Wales; Queensland).
TYPE: Male, Australian Museum.

Ploiaria nitida McAtee and Malloch

Figure 47Q

Ploiaria (Luteva) nitida MCATEE AND MALLOCH, 1925, p. 145, fig. 53.

The apex of the male pygophore is illustrated here.
DISTRIBUTION: Philippines.
TYPE: Male, United States National Museum.

Ploiaria noualhieri Villiers

Ploearia noualhieri VILLIERS, 1943, p. 92, figs. 4, 12, 21, 22.

DISTRIBUTION: Algeria.
TYPE: Male, Muséum National d'Histoire Naturelle.

Ploiaria obscura Wygodzinsky

Figure 45N, O, R, S, U

Ploiaria obscura WYGODZINSKY, 1956, p. 220, figs. 203–212.

The fore tarsus bears a single claw in this species (fig. 45S); some other characters are also illustrated.

MATERIAL EXAMINED: Australia: Victoria: Melbourne (G. F. Hill; South Australian Museum), one male; Tasmania (South Australian Museum), one male.
DISTRIBUTION: Australia (Tasmania, Victoria, New South Wales, Queensland).
TYPE: Female, Australian Museum.

Ploiaria oculata (Villiers), new combination

Culicimimus oculatus VILLIERS, 1949a, p. 316.

DISTRIBUTION: Madagascar.
TYPE: Male, Muséum National d'Histoire Naturelle.

Ploiaria pallida Montrouzier

Ploiaria pallida MONTROUZIER, 1855, p. 110.

If *Ploiaria pallida* Guérin, 1838, now considered to be of uncertain position, should ultimately prove to be a true member of *Ploiaria*, the present species would require a new name.
DISTRIBUTION: Woodlark Island.
TYPE: Unknown.

Ploiaria penai Wygodzinsky

Figure 49S

Ploiaria peñai WYGODZINSKY, 1954b, p. 310, figs. 63–68.

The unique pattern of the forewing of this species is shown in the illustration.
DISTRIBUTION: Bolivia.
TYPE: Female, Sociedad Claudio Gay.

Ploiaria phyllodoce Wygodzinsky and Usinger

Figure 53E–L

Ploiaria phyllodoce WYGODZINSKY AND USINGER, 1960, p. 240, figs. 3a–3 l.

Several of the original illustrations are reproduced here.
DISTRIBUTION: Caroline Islands.
TYPE: Male, United States National Museum.

Ploiaria pilicornis McAtee and Malloch

Ploiaria pilicornis MCATEE AND MALLOCH, 1925, p. 61, figs. 78, 79.

MATERIAL EXAMINED: United States: Arizona: Graham Mountains, Moon Creek, August 1, 1957 (G. D. Butler; University of Arizona), one male.
DISTRIBUTION: United States (Arizona).
TYPE: Male, United States National Museum.

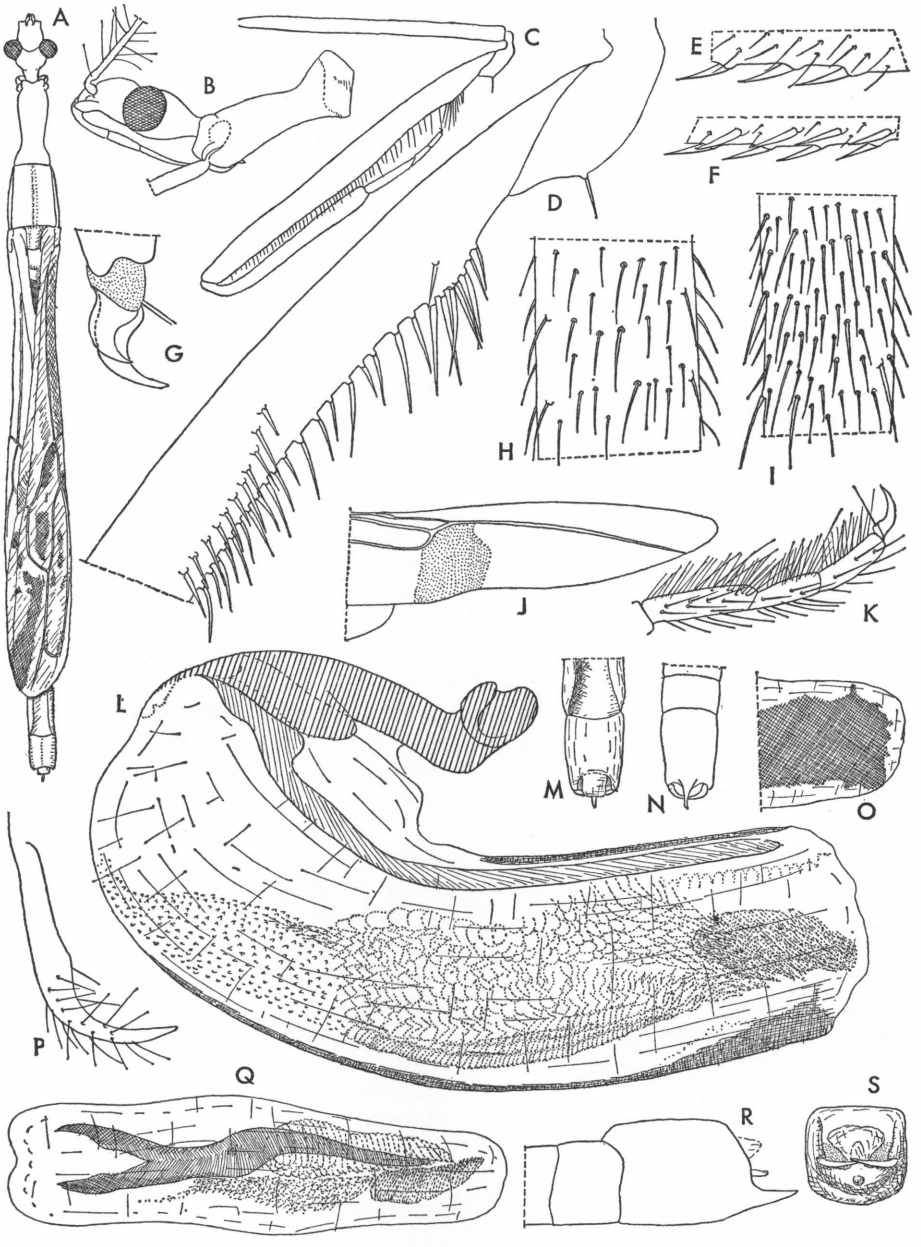


FIG. 57. *Ploiaria plaumanni*, male. A. General aspect, with color pattern of forewings shown. B. Head and prothorax, lateral view. C. Foreleg. D. Trochanter and base of fore femur. E. Spines of under surface of fore tibia. F. Spines of under surface of first segment of fore tarsus. G. Praetarsus and claws of foreleg. H. Portion of hind femur. I. Portion of hind tibia. J. Apical half of hind wing. K. Posterior tarsus. L. Phallus, lateral view. M. Genital region, dorsal view. N. Genital region, ventral aspect. O. Apex of ventral sclerotization of phallosoma. P. Paramere. Q. Phallosoma, dorsal aspect. R. Apex of abdomen, lateral view. S. Pygophore, seen from behind.

Ploiaria plaumanni, new species

Figure 57A–S

DESCRIPTION: Macropterous male: Length, 15–16 mm. Shape slender (fig. 57A).

General color piceous. Head ochraceous, darkened laterally before and behind eyes. First and third rostral segments fuscous, second ochraceous. Antennae ochraceous; first segment with a narrow basal, and a wide apical, fuscous annulus. Anterior acetabula ochraceous; dorsal portion of prothorax, especially anteriorly and posteriorly, flavous. 1+1 narrow, submedian stripes on mesonotum and lateral carinae ochraceous. Acetabula of mesothorax and metathorax clouded with flavous. Abdomen faintly clouded with ochraceous; parameres flavous. Forelegs of general color, all segments blotched with ochraceous and stramineous; base of first tarsal segment distinctly stramineous. Mid and hind femora ochraceous to castaneous, becoming very dark toward apex; a whitish subapical annulus distant from apex of segment by about twice width of former. Mid and hind tibiae ochraceous, their base castaneous. Forewings dull, cinereous, with irregularly shaped, brownish pattern elements (fig. 57A). Hind wings hyaline, iridescent, veins brownish. Body surface slightly shining, microscopically rugose; pilosity very short, adpressed.

Head and rostrum as shown in figure 57A, B. Distance between eyes dorsally equal to their width; eyes attaining level of dorsal and ventral surface in lateral view. First and second segments of antennae with long hairs as much as five times as long as diameter of segment, numerous on first and basal half of second segment, sparse on its apical half. Length of first segment, 11.2 mm.; relative length of segments, 1/0.7/0.25/0.18.

Thorax as shown in figure 57A, B. Pronotum elongate, narrowed on posterior third, posterior lobe flaring but not separated from fore lobe, its surface sparsely punctate. Mesonotum slightly shorter than pronotum, two-thirds as wide as long, moderately convex, its median longitudinal furrow very shallow.

Forelegs slender (fig. 57C). Coxa one-third longer than prothorax. Trochanter ventrally with a strong bristle inserted on a faint protuberance, this bristle (fig. 57D) distinctly more delicate than spinelike setae of femur. Femur 11 times as long as maximum width, slightly S-shaped. Ventral series (fig. 57D) composed of slender, spinelike setae of medium and small size, inserted on short, wartlike protuberances; none of setae longer than diameter of segment. Posteroventral series composed of from 50 to 55 setae decreasing in size toward apex of femur, those at base of series longest, forming a small cluster. Anteroventral series with approximately 45 setae, widely interrupted at base, a single seta basad of interruption. Fore tibia one-half as long as femur, under surface with one row of short, inclined, pointed spines (fig. 57E). Tarsus from three-fifths to one-half as long as tibia. First segment almost twice as long as second and third combined; third shorter than second. Under surface of tarsus with two series of small spines similar to those of tibia (fig. 57F). Two claws, inner distinctly smaller than outer (fig. 57G). Posterior femur surpassing apex of abdomen by 5–6 mm. Mid and hind femora and tibiae with microchaetae and macrochaetae (fig. 57H, I), those of tibia more numerous. Tarsi as shown in figure 57K; first segment longer than second or third; under surface of tarsi with very dense, delicate, simple hairs. Claws slender, simple.

Forewings falling short of apex of abdomen by 2.5 mm.; their shape and venation as, shown in figure 57A. Hind wings as shown in figure 57J; transverse thickening wide.

Abdomen very narrow, parallel-sided. Tergites and sternites with microchaetae and sparse macrochaetae. Eighth sternite and tergite both well developed, entirely exposed (fig. 57N, R). Pygophore occupying one-tenth of total length of abdomen; its shape subcylindrical (fig. 57N, R), its posterior border ventrally with a stout, horizontal, spinelike projection. Parameres transverse, slightly overlapping at apex, their exact shape and chaetotaxy as shown in figure 57P. Phallus asymmetrical. Struts separated at extreme base, fused into a narrow, irregularly bent sclerite on apical three-fourths of their extension (fig. 57Q). Phallobase membranous; dorsal sclerotization narrow; ventral sclerotization widened apically, distal portion irreg-

ularly shaped (fig. 57L, O). Endosoma asymmetrical, with three unequal groups of toothlike or spinelike projections (fig. 57L, Q).

MATERIAL EXAMINED: Brazil: Santa Catarina: Nova Teutonia, September 28, October 19, 1935 (F. Plaumann; collection Usinger), one male holotype; (F. Plaumann; the American Museum of Natural History), one male paratype.

OBSERVATIONS: This new species, named for its collector, can be distinguished easily from all other South American species of *Ploiaria* by the combination of its characters.

Ploiaria poncei Maldonado

Ploiaria (*Luteva*) *poncei* MALDONADO, 1948, p. 20, figs. 10–12.

DISTRIBUTION: Puerto Rico.

TYPE: Male, United States National Museum.

Ploiaria praedator (Champion)

Ploiariopsis praedator CHAMPION, 1898a, p. 174, pl. 10, figs. 22, 22a.

Ploiaria praedator: MCATEE AND MALLOCH, 1925, p. 52.

This species, which could not be included in the key, is probably very similar to *punctipes*.

DISTRIBUTION: Guatemala.

TYPE: British Museum (Natural History.)

Ploiaria praesentans (Distant), new combination

Elymas praesentans DISTANT, 1909, p. 504.

Distant (1910) gave two figures of this species.

Usinger (personal communication) has examined the type; from his data it is obvious that *praesentans* would key out along with *thetis*, *phyllodoce*, and *glabella*.

DISTRIBUTION: Ceylon.

TYPE: British Museum (Natural History).

Ploiaria punctipes McAtee and Malloch

Ploiaria punctipes MCATEE AND MALLOCH, 1925, p. 62, figs. 82, 83.

DISTRIBUTION: Panama.

TYPE: Male, United States National Museum.

Ploiaria putoni Noualhier

Ploiaria putoni NOUALHIER, 1895, p. 168, pl. 1, fig. 6.

This species has been well illustrated by Villiers (1943).

DISTRIBUTION: France; Spain.

TYPE: Unknown.

Ploiaria recta McAtee and Malloch

Ploiaria (*Luteva*) *recta* MCATEE AND MALLOCH, 1926, p. 144, fig. 49.

DISTRIBUTION: Philippines.

TYPE: Male, United States National Museum.

Ploiaria regina Wygodzinsky

Figure 47L, M

Ploiaria regina WYGODZINSKY, 1965, p. 220, figs. 214–227.

The head and thorax of the micropterous form and part of the foreleg are here illustrated.

DISTRIBUTION: Australia (Queensland).

TYPE: Male, Entomology Department, University of Brisbane.

Ploiaria reticulata (Baker)

Figure 46E

Ploiariopsis recticulata BAKER, 1910, p. 225, figs. 97A, 97H–97J.

Ploiaria reticulata: MCATEE AND MALLOCH, 1925, p. 63.

The anterior portion of the body of the male is here illustrated.

MATERIAL EXAMINED: Mexico: Sonora: Desembarque, August 20–31, 1953 (B. Malkin; the California Academy of Sciences), one male.

DISTRIBUTION: United States (California, Texas); Mexico.

TYPE: Cornell University.

Ploiaria rufoannulata (Bergroth)

Luteva rufoannulata BERGROTH, 1911, p. 18.

Ploiaria rufoannulata: MCATEE AND MALLOCH, 1925, p. 57.

DISTRIBUTION: Jamaica.

TYPE: The California Academy of Sciences.

Ploiaria sachtlebeni Villiers

Ploearia sachtlebeni VILLIERS, 1948, p. 446.

This species is based on nymphs.

DISTRIBUTION: Fernando Poo.

TYPE: Nymph, Deutsches Entomologisches Institut.

Ploiaria sefrana Dispons

Ploearia sefrana DISPONS, 1960a, p. 295, figs. 1–5.

DISTRIBUTION: Algeria.

TYPE: Female, Muséum National d'Histoire Naturelle.

Ploiaria setulifera McAtee and Malloch

Figure 46C

Ploiaria setulifera MCATEE AND MALLOCH, 1925, p. 55, fig. 71.

The drawing illustrates the foreleg of this species.

DISTRIBUTION: United States (Florida); Cuba.

TYPE: Female, United States National Museum.

Ploiaria sexdentata Lindberg

Ploiaria 6-dentata LINDBERG, 1932, p. 46.

It seems possible that this species has been redescribed by Villiers (1943) as *P. berlandi.*

DISTRIBUTION: Morocco.

TYPE: Museum Zoologicum Universitatis.

Ploiaria sicaria McAtee and Malloch

Ploiaria sicaria MCATEE AND MALLOCH, 1925, p. 55, fig. 70.

DISTRIBUTION: Bolivia.

TYPE: Male, United States National Museum.

Ploiaria similis McAtee and Malloch

Figure 46F, I–K

Ploiaria similis MCATEE AND MALLOCH, 1925, p. 62, fig. 84.

Several of the structural details of this species are illustrated here.

DISTRIBUTION: United States (Texas); Mexico.

TYPE: Male, United States National Museum.

Ploiaria sonoraensis (Van Duzee)

Ploiariopsis sonoraensis VAN DUZEE, 1923, p. 144.

Ploiaria sonoraensis: MCATEE AND MALLOCH, 1925, p. 52.

The identity of this species has not been clearly established.

DISTRIBUTION: Gulf of California (San Diego Island).

TYPE: The California Academy of Sciences.

Ploiaria soudanica Dispons

Ploearia soudanica DISPONS, 1960b, p. 1312, figs. 1–5.

DISTRIBUTION: Sudan.

TYPE: Female, Muséum National d'Histoire Naturelle.

Ploiaria texana Nathan Banks

Ploiaria texana NATHAN BANKS, 1909, p. 44.

McAtee and Malloch (1925) believed that they may have renamed this species in their *similis.* As the abdomen of the type is missing, and the genitalia were not figured or described, they consider identification of *texana* impracticable.

DISTRIBUTION: United States (Texas).

TYPE: Museum of Comparative Zoölogy.

Ploiaria thetis Wygodzinsky and Usinger

Figure 53A–D

Ploiaria thetis WYGODZINSKY AND USINGER, 1960, p. 239, figs. 2a–2k.

The illustrations reproduced here are taken from the original description.

DISTRIBUTION: Caroline Islands.

TYPE: Male, United States National Museum.

Ploiaria tuberculata Villiers

Ploearia tuberculata VILLIERS, 1949a, p. 313, figs. 130–133.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Female, Zoologisches Museum, Hamburg.

Ploiaria ultima McAtee and Malloch

Figure 47 O, P

Ploiaria (Luteva) ultima MCATEE AND MALLOCH, 1926, p. 144, figs. 52, 54.

Ploiaria (Luteva) zebrina MCATEE AND MALLOCH, 1926, p. 145 (new synonymy).

The third tarsal segment of the mid and hind legs of this species has a scopula, and the respective claws have pointed processes. A detail of the hind wings and the posterior view of the male pygophore are illustrated here; the endosoma of the male is asymmetrical.

The characters given by McAtee and Malloch (1926) for distinguishing *zebrina* from

ultima are the highly glossy pronotum and the hardly visible pubescence of *ultima*, as well as the fine barring of the lateral portions of the mesonotum of *zebrina*. I have examined the types of both species and observed that there is no difference in the degree of gloss of the pronotum, the delicate pubescence is equally discernible in both species, and the fine barring of the mesonotum of *zebrina* is an artifact caused by muscle bundles partly visible through the tergum. In the absence of other differential characters, the above synonymy is established.

MATERIAL EXAMINED: Philippines: Luzon: Mt. Makiling (Baker; United States National Museum), four males, four females; Mt. Makiling (A. Duyag; United States National Museum), one specimen; Ube Laguna, May, 1930 (McGregor; United States National Museum), one specimen. Biliran Island (Baker; United States National Museum), one specimen.

DISTRIBUTION: Philippines.

TYPES: Of *ultima*, male, United States National Museum; of *zebrina*, female, United States National Museum.

Ploiaria umbrarum McAtee and Malloch

Ploiaria umbrarum MCATEE AND MALLOCH, 1925, p. 60.

The original description of this species was based on a male. Maldonado and Farr (1962) described and illustrated the female. This is one of only two species that are known to be cavernicolous in the Western Hemisphere.

DISTRIBUTION: Jamaica.

TYPE: Male, United States National Museum.

Ploiaria uniseriata McAtee and Malloch

Figure 46L, M

Ploiaria uniseriata MCATEE AND MALLOCH, 1925, p. 61, figs. 80, 81.

This species has been known only from winged males and apterous females. The apterous male is reported, herein, for the first time. The lateral aspect of the fore portion of the body is illustrated, as well as the shape of the discal cell of the forewing.

MATERIAL EXAMINED: *Guatemala*: No locality, 1939 (United States National Museum), one female. *Mexico*: San Luis Potosí, intercepted on *Laelia* sp. at Brownsville, Texas, July 18, 1947 (United States National Museum and the American Museum of Natural History), three apterous females, (United States National Museum), one apterous male, three nymphs.

DISTRIBUTION: United States (Texas); Mexico; Guatemala.

TYPE: Male, United States National Museum.

Ploiaria varipennis McAtee and Malloch

Ploiaria varipennis MCATEE AND MALLOCH, 1925, p. 56, figs. 73, 74.

DISTRIBUTION: Guatemala.

TYPE: Male, United States National Museum.

Ploiaria wahrmani Wygodzinsky

Figure 47T, U

Ploiaria wahrmani WYGODZINSKY, 1952a, p. 102, figs. 1–10.

The general aspect of the female and the posterior aspect of the male pygophore are here illustrated.

Dispons and Stichel (1959) erroneously indicated Syria as in the range of this species.

DISTRIBUTION: Israel.

TYPE: Male, Hebrew University.

Ploiaria woodwardi Wygodzinsky

Figure 45 I, T, V

Ploiaria woodwardi WYGODZINSKY, 1956, p. 221, figs. 228–233.

Two figures taken from the original description are reproduced here.

DISTRIBUTION: Australia (Queensland).

TYPE: Male, Entomology Department, University of Brisbane.

Ploiaria yunquensis Maldonado

Ploiaria (Luteva) yunquensis MALDONADO, 1948, p. 19, figs. 1–3, 14, 15.

DISTRIBUTION: Puerto Rico.

TYPE: Male, United States National Museum.

PSEUDOBAGAUDA, NEW GENUS

DESCRIPTION: Macropterous. Small species (9–9.5 mm.).

Body surface polished, glabrous, distinct pilosity on genital segments only. Color pattern conspicuous.

Head fusiform, anteocular portion longer than postocular, latter subsemiglobular, distinctly separated from short neck. Interocular furrow originating at level of posterior border of eyes, curved backward to much behind said level, not forming an incision, thus outline of dorsal surface of head continuous in lateral view. Eyes large, almost attaining level on under surface of head. Rostrum slender, very slightly bent between first and second segments, latter not widened, slightly but distinctly longer than first, third subequal to second.

Pronotum completely covering mesonotum; scutellum fully exposed. Fore lobe of pronotum subcylindrical, narrowed on posterior third; hind lobe subquadrate. Scutellum and metanotum without process or spine. Posterior border of prosternum rounded.

Forelegs relatively stout. Coxa simple; trochanter with a few very short setae. Femur wide, slightly angulate just beyond base, with anteroventral and posteroventral series composed of slender, spinelike setae inserted on very short, wartlike bases and accessory series consisting of short, peglike spines. Posteroventral series beginning at base of article; some of spinelike setae at base of series slightly but distinctly longer than any of others. Anteroventral series beginning somewhat apicad, not interrupted at base. Spinulets of accessory series arranged in one or two irregular rows. Tibia slightly more than half as long as femur, slightly produced at apex below, on ventral surface with deflexed spines. Fore tarsus more than half as long as tibia, three-segmented, basal segment more than twice as long as second and third combined, all bare with exception of fascia of short bristles at base of first segment. One large claw and one very much reduced clawlike structure at its base.

Forewings with portion of M limiting anterior border of discal cell not quite attaining posterior basal angle; a triangular cell situated at base of discal cell, formed by M, cross vein connecting anterior basal angle of discal cell to costal margin, and submarginal vein. Pcu joining discal cell at an acute angle, free portion of 1A leading to posterior border of wing obsolete. Pterostigma carried virtually to apex of wing. Hind wings with hamus approaching Sc+R gradually but meeting it at a short distance from level of cross vein; latter short, perpendicular to longitudinal axis of wing. Cu projecting shortly beyond cross vein, upwardly curved. R+M projecting beyond level of cross vein to apex of wing. Transverse thickening not developed.

Abdomen slender, somewhat narrowed at base.

Male: Eighth sternite rather wide, semiannular, attaining level of dorsal surface of abdomen. Posterior wall of pygophore upwardly reflected, broadly lamellate, its upper border widely emarginate and with numerous long hairs. Parameres large. Phallus symmetrical. Basal plates short, their center connected to dorsal wall of phallobase by a rod-shaped sclerite. Phallotheca membranous, endosoma with usual toothlike projections.

TYPE SPECIES: *Pseudobagauda uganda*, new species.

ETYMOLOGY: *Pseudo-*, and *Bagauda*, a genus of the Emesinae.

DISTRIBUTION: East Africa.

OBSERVATIONS: The structure of the head and forewings shows *Pseudobagauda* to be closely related to *Guithera* and *Bagaudella*, especially the latter. The new genus differs by the structure of its pronotum, which has not suffered any reduction in the size of the hind lobe, by the triangular cell at the base of the large discal cell, the peculiar discal region of Pcu+1A, and the structure of the male pygophore. The forewardly bent Cu, which for a short space runs parallel to the cross vein connecting the anterior basal angle of the discal cell to the submarginal vein, seems to show how Cu might eventually "capture" the cross vein and carry it to basad of the base of the discal cell, a condition realized in *Guithera* (see figs. 33A; 34A).

Pseudobagauda uganda, new species
Figure 58A–O

DESCRIPTION: Male and female: Length to apex of forewings, 9 mm. in male, 9.5 mm. in female.

Head, antennae, and rostrum piceous, apex of clypeus whitish, third segment of rostrum yellowish. Fore lobe of pronotum (fig. 58A) orange-yellow, anterior sixth reddish, hind lobe piceous; acetabula piceous. Ventral surface of pronotum orange-yellow, with excep-

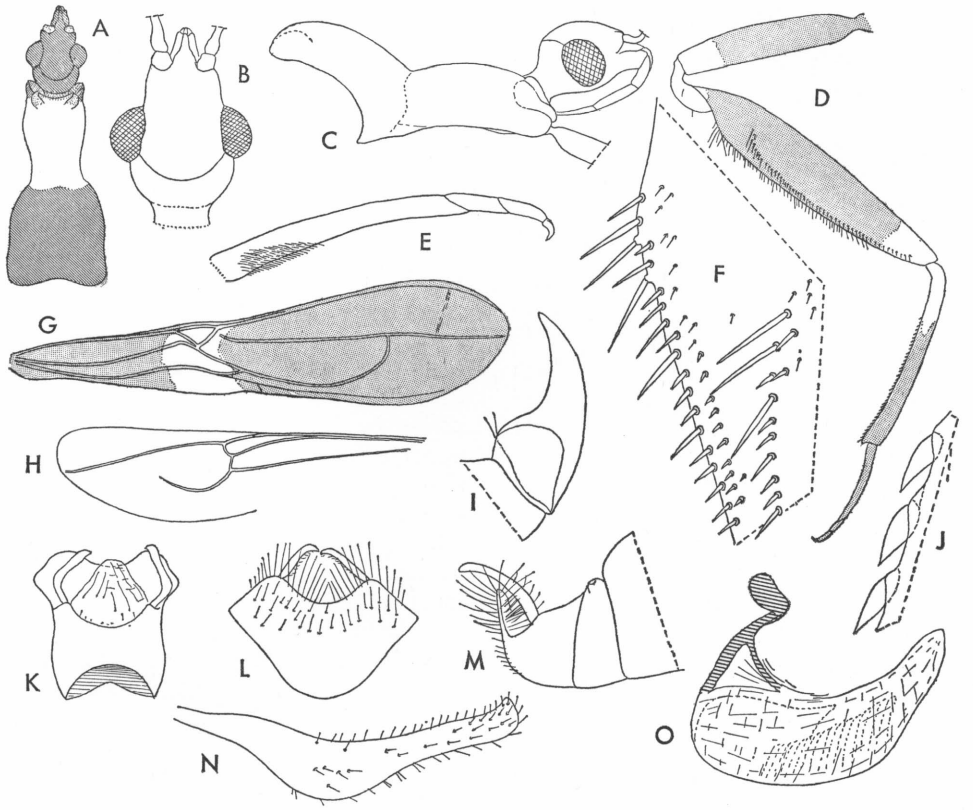


FIG. 58. *Pseudobagauda uganda*, male. A. Head and prothorax, dorsal view, with color pattern. B. Head, dorsal aspect. C. Head and prothorax, lateral view. D. Foreleg, with color pattern. E. Fore tarsus. F. Basal portion of fore femur. G. Forewing, with color pattern. H. Hind wing. I. Praetarsus and claw of foreleg. J. Spines of under side of fore tibia. K. Pygophore, seen from above. L. Pygophore, hind view. M. Genital region, lateral aspect. N. Paramere. O. Phallus, lateral view.

tion of a piceous band along hind border of of prosternum. Mesothorax and metathorax piceous. Forelegs (fig. 58D) piceous; apex of coxa, trochanter, extreme base and apex of femur, as well as base of tibia, whitish. Coxa and trochantera of mid and lind legs piceous, femora and tibiae light brown, apex of femora and base of tibiae whitish. Forewings (fig. 58G) piceous, somewhat darker on base than on apical half, with a large, white, transverse band somewhat basad of middle of wing. Abdomen whitish on basal third, the rest piceous.

Shape of head and rostrum as given in generic description and shown in figure 58A, B. Dorsal surface highly convex, no constriction between anterior and posterior lobe in lateral view. Distance between eyes dorsally slightly larger than twice their width. In lateral view, eyes of male completely, in female almost, attaining ventral level of surface of head. Antennae of female bare; length of first segment, 6.5 mm.; relative length of segments, 1/0.85/0.27/?.

Pronotum as given in generic description and shown in figure 58A, C. Fore lobe very slightly shorter than hind lobe, smooth. Hind lobe very faintly rugose, on its anterior half with traces of a median longitudinal ridge; humeri faintly elevated. Forelegs as given in generic description and shown in figure 58D–F, I, J. Spines on ventral surface of tibia arranged in a single file. Fore coxa as long as prothorax ventrally. Mid and hind legs without special characters; hind femora surpassing apex of forewings by about 5 mm.

Forewings as given in generic description and shown in figure 58G, slightly surpassing tip of abdomen. Apical portion of M two-thirds as long as discal cell.

Abdomen keeled, moderately constricted at base.

Male: General structure of genital region as given in generic description and shown in figure 58K–M. Shape and chaetotaxy of parameres and structure of phallus as given in generic description and shown in figure 58N, O.

MATERIAL EXAMINED: Uganda: West Madi, September, 1921 [H. Hargreaves; British Museum (Natural History)], one male holotype; north of Chua, December, 1925 [G. D. H. Carpenter; British Museum (Natural History)], one female allotype.

TINNA DOHRN

Tinna DOHRN, 1859, p. 52.

DESCRIPTION: Macropterous or apterous. Small species (5–10.5 mm.).

Body surface dull to shining. General color generally testaceous or dark, markings mostly inconspicuous.

Macropterous male: Head variously shaped, anteocular longer than postocular region, somewhat elevated, its sides subparallel in dorsal view; sides of postocular region rarely subparallel, more frequently rounded behind eyes, with posterolateral angles conspicuous at base of sharply constricted neck. Under surface of head with three, rarely with four or five, pairs of spiniferous tubercles. Interocular furrow situated before level of center of eyes, almost straight across or only slightly curved, not surpassing level of center of eyes. Eyes large, attaining level of under surface of head. Rostrum moderately slender, straight, not bent between first and second segments, all segments of subequal size; first segment approaching level of anterior border of eye, second that of posterior border. Antennae inserted near anterior border of head.

Pronotum not covering mesonotum. Fore lobe from suboval to subglobular, more or less sharply separated from hind lobe, latter very short, collar-like. Scutellum and metanotum simple, lacking processes or spines. Upper portion of anterior acetabula conspicuously angulate, or transformed into a long, forwardly and downwardly directed spine. Posterior border of prosternum emarginated at center.

Forelegs relatively short. Coxa on inner surface apically with or without a few short, linearly arranged spines. Fore trochanter with a large spiniferous projection and a few additional spinelike setae. Femur from being slender, almost parallel-sided, to distinctly widened toward middle, with posteroventral and anteroventral, and with or without accessory, series. Posteroventral series beginning at base of article, composed of four or five outstanding, elongate, and numerous short, spiniferous processes. Anteroventral series beginning slightly distad of posteroventral series, not interrupted at base, consisting of medium-sized to short spines inserted on short, wartlike bases. Accessory series, when present, composed of short spinulets of uniform size. Fore tibia about two-thirds as long as femur, stout, ventrally with two (rarely with a single) series of variously shaped spines. Fore tarsus half as long as tibia or slightly less; tibia and tarsus combined generally as long as femur. Tarsus three-segmented, the three segments subequal in length, or first somewhat longer than second or third, latter two subequal in size; all bare above and at sides, ventrally with one series of simple spinelike setae. One simple large claw and one very strongly reduced second claw present. Mid and hind legs slender, hind femora considerably surpassing apex of abdomen; femora with not very numerous short, spinelike setae and numerous tiny, ridgelike elevations. Tarsi of mid and hind legs with segments subequal in length, setae simple; claws slender, curved, simple.

Forewings with discal cell as usual for tribe, cross veins connecting anterior and posterior basal angle of cell to submarginal vein, in every case developed. Apex of pterostigma falling short of wing tip. Hind wing with hamus approaching Sc+R only gradually, joining same at some distance from level of cross vein; latter very short, perpendicular to longitudinal axis of wing. R+M and Cu projecting beyond level of cross vein, both simple, not joining; R+M almost attaining wing tip, Cu considerably shorter. Transverse thickening apparently lacking.

Abdomen slender, somewhat widened to-

ward posterior third, generally weakly chitinized. Connexival margins entire, forming a continuous outline. Sternites with variously modified setae of subequal size. Eighth sternite large, well developed, semi-annular. Pygophore medium-sized, elongate-oval in lateral view, its dorsal sclerotization extensive; posterosuperior border with a small, compressed, bifurcate process, very rarely with a single point only. Parameres rod-shaped, curved apically, with medium-sized bristles. Phallus symmetrical, large, occupying whole length of pygophore in unevaginated condition. Basal plates short, wide. Phallobase elongate-cylindrical, somewhat curved, in most cases largely membranous. Struts strongly reduced, consisting of 1+1 short, slender, chitinous rods apparently not connected to articulatory apparatus. Endosoma symmetrical, with 2+2 groups of toothlike projections, those of dorsal group broadly triangular, those of ventral groups slender, spinelike.

Apterous male and female: General characters like those of winged male. Head often more strongly elevated above; eyes smaller. Pronotum like that of winged form. Mesonotum shorter than pronotum, metanotum shorter than mesonotum, both combined longer than pronotum. General structure of forelegs like that of winged form, but occasionally femur very strongly swollen.

Abdomen membranous or strongly sclerotized, tergites in some cases with tubercles at center. Male genitalia like those of winged form. Eighth and ninth tergites of female well developed, former somewhat shorter than latter, wider than long, subhorizontal; ninth more or less distinctly trifid apically, subvertical. Gonocoxites and gonapophyses separated. Syngonapophysis deeply incised apically, not very prominent when *in situ*.

TYPE SPECIES: *Emesa gracilis* Stål (monobasic).

DISTRIBUTION: Ethiopian Region; North Africa; one species, secondarily, Japan.

OBSERVATIONS: Dr. R. Hussey has called my attention to the fact that Dohrn (1859) has validated *Tinna* by listing it with a previously described species; the formal description of *Tinna* was given later (Dohrn, 1860).

The species of the genus seem to concentrate in the more arid portions of the African continent and also show a tolerance for high altitude, a trait that is not common in the subfamily.

As in other semiarid-zone emesines, pterygopolymorphism is a conspicuous phenomenon in the present genus. Males are known both from winged and apterous forms, females from apterous forms only. There seems to be some evidence, in one species at least, that both types of males may occur together (*maculipes*).

The available descriptions of several species of *Tinna* are very short and lack some data considered by the present author to be essential for the characterization of an emesine species. The following key is not perfect, and in all cases a comparison with actual material or descriptions is strongly recommended.

KEY TO THE SPECIES OF *Tinna*

1. Macropterous males 2
   Apterous males and females 8
2. Head, mesothorax and metathorax dark brown, prothorax whitish (fig. 60E); fore femur dark brown, whitish at extreme base and apex (fig. 60E) . . . . . *picta*
   General color testaceous, including fore femur 3
3. Size, 5 mm. . . . . *gracilis*
   Size, 6 mm. or more 4
4. Upper portion of anterior acetabula pointed, but not distinctly surpassing anterior border of prosternum 5
   Upper portion of anterior acetabula extended into a long spine which considerably surpasses anterior border of prosternum (fig. 59B) 6
5. Size, 6 mm.; distance between eyes dorsally as large as width of eyes; posterior margin of head almost vertical in lateral view . . . . . *elegans*
   Size, more than 6 mm.; distance between eyes dorsally almost twice their width; posterior margin of head forming a distinct angle with its longitudinal axis in lateral view . . . . . *gaillardi, nimbana*
6. Prothorax about as long as head in lateral view; fore lobe of pronotum strongly convex in lateral view . . . . . *alata*
   Prothorax longer than head in lateral view (fig. 59B); fore lobe of pronotum faintly convex only (fig. 59B) 7
7. Pronotum almost twice as long as its maximum width; bifurcate projection of pygo-

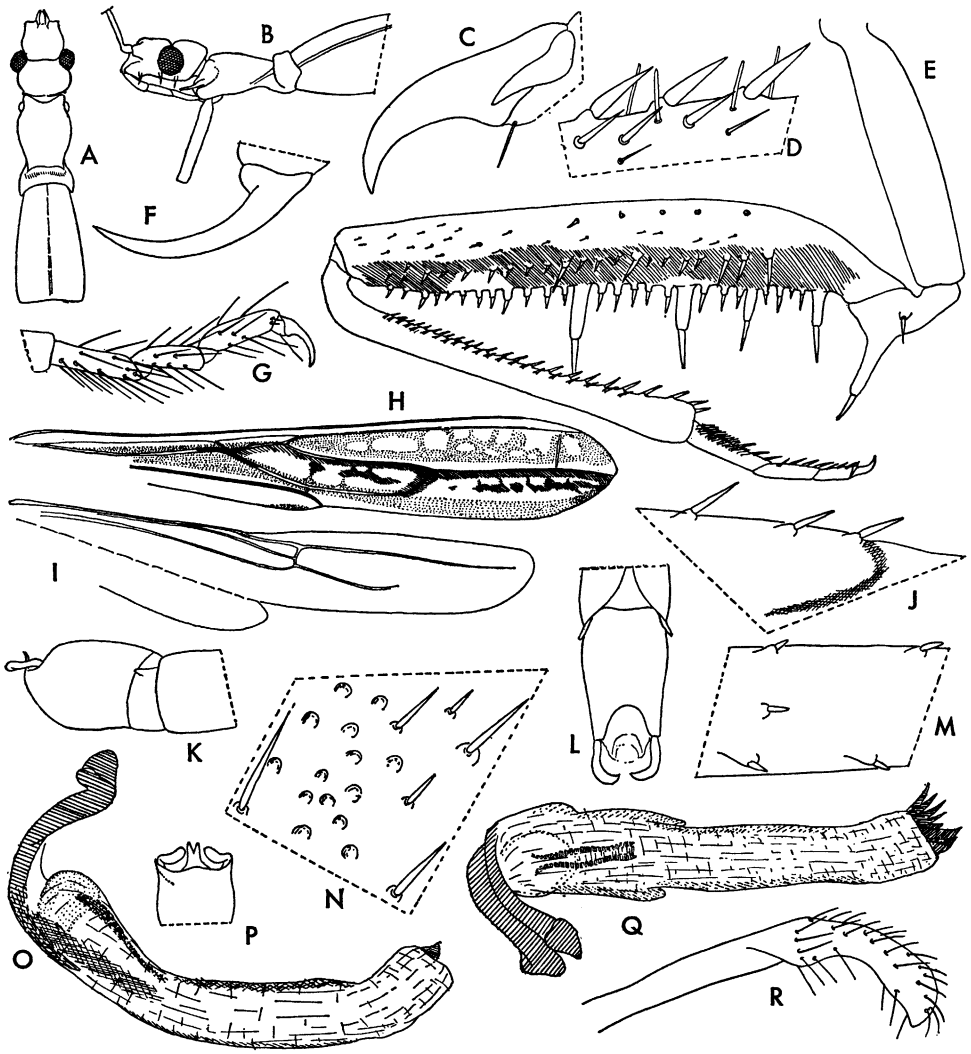


FIG. 59. *Tinna spinicollis*, macropterous male. A. Anterior portion of body, dorsal view. B. Anterior portion of body, side view. C. Claws of foreleg. D. Spines of under surface of fore tibia. E. Foreleg, color pattern of femur shown only. F. Claw of hind leg. G. Posterior tarsus. H. Forewing, with color pattern. I. Hind wing. J. Apex of pterostigma. K. Apex of abdomen, lateral view. L. Genital region, dorsal aspect. M. Portion of hind femur. N. Surface of abdominal sternite, high magnification. O. Phallus, lateral view. P. Apex of pygophore, seen from behind. Q. Phallus, dorsal view, articulatory apparatus twisted. R. Paramere.

phore distinctly longer than wide at base; color pattern of fore femur consisting of annulations and spots . . . . . *maculipes*

Pronotum only about one and a half times as long as maximum width (fig. 59A); projection of pygophore not longer than wide at base (fig. 59P); color pattern of fore femur consisting of a continuous, dark, ventral stripe (fig. 59E) . . . . . *spinicollis*

8. Abdomen with conspicuous tubercles centrally on hind border of six tergites (fig. 61A, D) 9

Abdomen without the tubercles mentioned (fig. 61G, H) or, if present, on fifth and sixth tergites only and almost imperceptible 10

9. Head, upper portion of fore femora, mesonotum, and metanotum dark brown; upper surface of head with four or five pairs of setiferous processes . . . . *serratifemora*

General color of the regions mentioned testaceous; under surface of head with three pairs of setiferous processes only . . *gracilis*

10. Size; 6 mm. or less; fore lobe of pronotum subglobular (fig. 60D) 11
Size, 7 mm. or more, only in one case 6 mm.; fore lobe of pronotum never subglobular 12

11. Abdomen (at least in female) membranous (fig. 61G), uniformly pale, tergites with 1+1 percurrent dark fasciae; head elongate in lateral view (fig. 60C); many spines of fore femur and tibia rounded apically (fig. 60H, P) . . . . . *ventricosa*
Abdomen heavily sclerotized in both sexes, strikingly bicolorous dorsally (fig. 61H); head short in lateral view (fig. 60F); all spines of fore femora pointed apically (fig. 60L) . . . . . *keiensis*

12. Upper portion of fore acetabula angulate, short, not or hardly surpassing level of anterior border of prosternum (fig. 60B) . .13
Upper portion of fore acetabula projected into a long, forwardly directed spine which considerably surpasses anterior border of prosternum (fig. 59B) 19

13. Lateral surface of thorax and ventral surface of abdomen testaceous; postocular portion of head almost parallel-sided in dorsal view (fig. 60I) 14
Lateral surface of thorax with brownish pattern elements; ventral surface of abdomen testaceous, or with more or less extensive brown pattern; sides of postocular portion of head distinctly rounded in dorsal view (fig. 60A) 15

14. Head more than twice as long as wide at base in dorsal view (fig. 60I); pronotum about as long as head . . . . . *zonata*
Head not more than twice as long as wide at base; pronotum a little less than twice as long as head . . . . . *obockiana*

15. Fore tibia and tarsus combined distinctly shorter than femur 16
Fore tibia and tarsus combined as long as femur (fig. 60B) . . . . *grassator, elongata*

16. Dorsal surface of head and thorax uniformly light brown; external surface of fore femora dark brown . . . . . *berlandi*
Dorsal surface of head and thorax testaceous, with brown pattern elements; external surface of fore femora testaceous, with brown spots 17

17. Fore femora with scattered small brown spots and a large subapical dark spot; apex of mid and hind femora and base of mid and hind tibia white; size, 10 mm. 18
Fore femora with scattered small brown spots only, lacking large subapical spot; femora of second and third pair with a subapical, tibiae with a subbasal, white annulus; size, 8 mm. . . . . *basilewskyi*

18. Lateral projections of ninth tergite of female relatively slender, sharply pointed, their apex falling considerably short of that of median projection; sides of latter constricted; posterior border of eighth tergite slightly pointed at middle . . . . . *gaillardi tibestina*
Lateral projections of ninth tergite of female relatively wide, less sharply pointed, their apex almost at level with that of median projection, sides of latter not constricted; posterior margin of eighth tergite not projecting at middle . . *gaillardi zinderiana*

19. Fore and hind lobe of pronotum separated by a deep transverse incision (as in fig. 59A, B); size, 6 mm. . . . . *spinicollis*
Pronotum not separated into a distinct fore and hind lobe by a deep incision; size, more than 6 mm. 20

20. Size, 7.5–8 mm.; posterior femora with white apical annulus . . . . . *maculipes*
Size, 9–10 mm.; posterior femora lacking white annulus or, if present, preapical . .21

21. Femora of second and third pair with a white preapical annulus; mesonotum as long as pronotum . . . . . *wagneri*
Femora of second and third pair lacking white annulus; mesonotum shorter than pronotum . . . . . *balboi*

Tinna atlantis and the female of *Tinna nimbana* could not be placed in the key.

Tinna alata Villiers

Tinna alata Villiers, 1952c, p. 37, fig. 25.

Distribution: Angola.

Type: Male, Muséum National d'Histoire Naturelle.

Tinna atlantis Dispons

Tinna atlantis Dispons, 1955, p. 177 (footnote).
Tinna maroccana Dispons, 1955, p. 177 (footnote).

Dispons (1963) described and illustrated some details of *T. atlantis* and listed *maroccana* as a variety.

Distribution: Morocco.

Type: Unknown.

Tinna balboi Menozzi

Tinna balboi Menozzi, 1940, p. 255, figs. 4A–4C.

Distribution: Libya.

Type: Unknown.

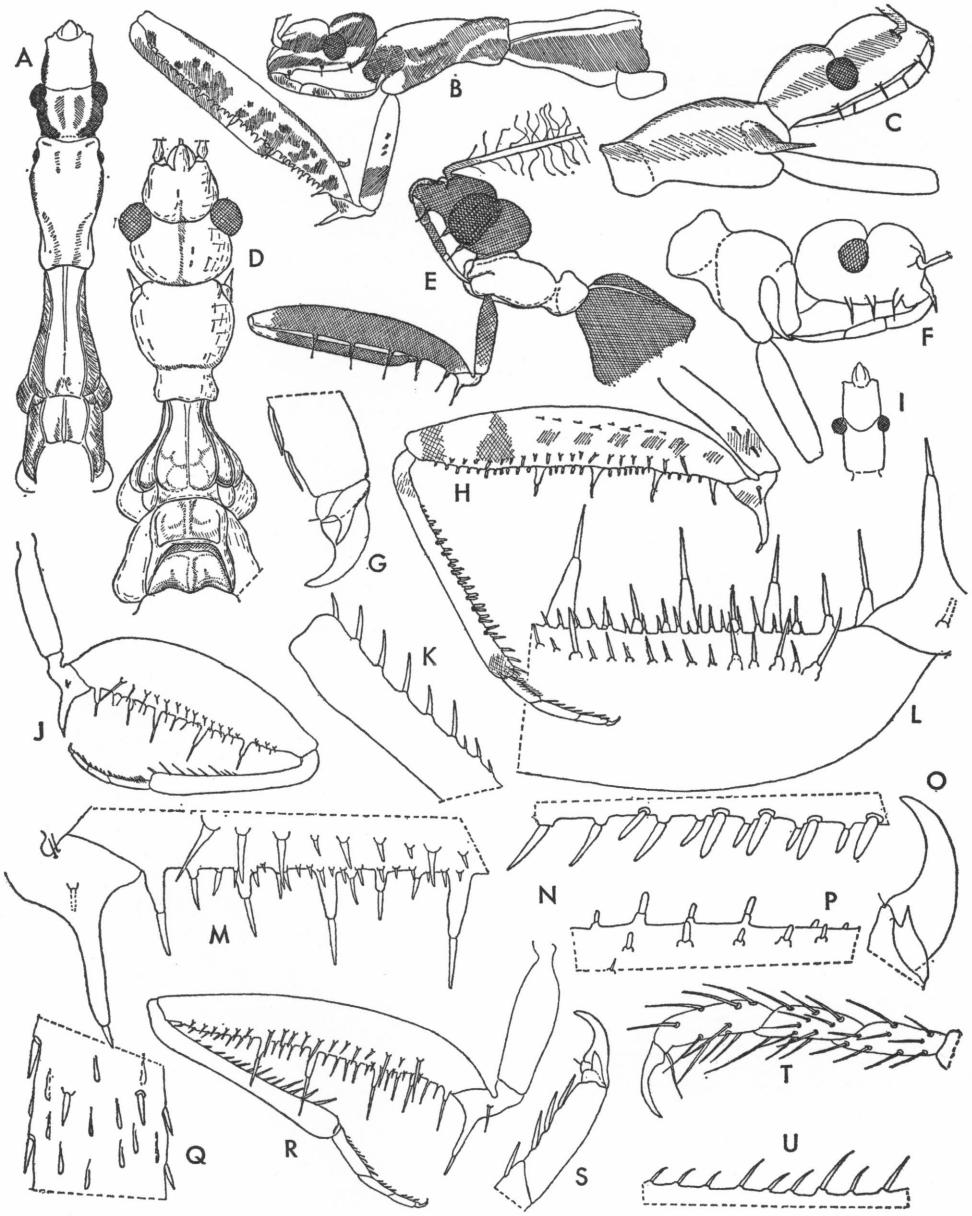


FIG. 60. A, B. *Tinna grassator*, specimen from Japan. A. Anterior portion of body, dorsal view, color pattern shown. B. Anterior portion of body, lateral aspect, with color pattern. C. *Tinna ventricosa*, female, anterior portion of body, lateral view, with color pattern. D. *Tinna keiensis*, male, anterior portion of body, dorsal view. E. *Tinna picta*, male, anterior portion of body, lateral view, with color pattern. F. *Tinna keiensis*, male, anterior portion of body, lateral view. G. *Tinna gracilis*, apex of fore tarsus, with claws. H. *Tinna ventricosa*, foreleg, with color pattern. I. *Tinna zonata*, male, head, seen from above. J, K. *Tinna gracilis*. J. Foreleg. K. Apical portion of fore tibia. L. *Tinna keiensis*, trochanter and base of femur of foreleg. M. *Tinna picta*, trochanter and under surface of base of fore femur. N–P. *Tinna ventricosa*. N. Spines of under surface of fore tibia. O. Claws of foreleg. P. Setae of under surface of fore femur. Q–U. *Tinna picta*. Q. Portion of hind femur. R. Foreleg. S. Apex of fore tarsus, with claws. T. Posterior tarsus. U. Setae of under surface of fore tibia. (I adapted from Miller, 1954b.)

Tinna basilewskyi Villiers

Tinna basilewskyi VILLIERS, 1960a, p. 456, figs. 4, 5.

DISTRIBUTION: Tanganyika.
TYPE: Female, Musée Royal de l'Afrique Centrale.

Tinna berlandi Villiers

Figure 61R

Tinna berlandi VILLIERS, 1948, p. 449, figs. 869–872.

The general aspect of the female genital region is illustrated here.
DISTRIBUTION: Senegal; Guinea.
TYPE: Female, Muséum National d'Histoire Naturelle.

Tinna elegans Villiers

Tinna elegans VILLIERS, 1948, p. 450, figs. 873–877.

DISTRIBUTION: Central African Republic; Ruanda.
TYPE: Male, Muséum National d'Histoire Naturelle.

Tinna elongata Villiers

Tinna elongata VILLIERS, 1952c, p. 36, fig. 24.

To judge from the descriptions alone (Villiers, 1952b; 1961), this species does not seem to be different from a North African specimen I have identified as *grassator*, a species subject to wide-ranging passive dispersal (see below).
DISTRIBUTION: Angola; Congo (Léopoldville).
TYPE: Male, Muséum National d'Histoire Naturelle.

Tinna gaillardi Villiers

Tinna gaillardi VILLIERS, 1960b, p. 273, figs. 10–12.

DISTRIBUTION: Niger.
TYPE: Male, Muséum National d'Histoire Naturelle.

Tinna gaillardi tibestina Villiers

Tinna gaillardi subsp. *tibestina* VILLIERS, 1960d, p. 1328, figs. 10, 11.

This is possibly a valid species.
DISTRIBUTION: Chad (Tibesti).
TYPE: Female, unknown.

Tinna gaillardi zinderiana Villiers

Tinna gaillardi var. *zinderiana* VILLIERS, 1960b, p. 274, figs. 13, 14.

Tinna gaillardi is based on a winged male; Villiers' "variety," on apterous specimens of both sexes collected at the same locality. Possibly *zinderiana* is only the apterous form of *gaillardi*.
DISTRIBUTION: Niger.
TYPE: Male, Muséum National d'Histoire Naturelle.

Tinna gracilis (Stål)

Figures 60G, J, K; 61A, D, T, W, X

Emesa gracilis STÅL, 1855, p. 45.
Tinna gracilis: DOHRN, 1860, p. 246, figs. 22, 26.

The species is based on a winged male from "Caffraria." Both Villiers (1949a, p. 319) and Wygodzinsky (1958a, p. 141) considered apterous males and females from the Cape Province and Basutoland as also belonging here, though proof for their assertion has not been advanced. Both authors furnished partial redescriptions accompanied by figures; some of these are reproduced here and a few new ones are added.
DISTRIBUTION: "Caffraria"; South Africa (Cape Province, Natal); Basutoland.
TYPE: Male, Naturhistoriska Riksmuseet.

Tinna grassator (Puton)

Figure 60A, B

Cerascopus grassator PUTON, 1874, p. 440.
Ploearia grassator: LETHIERRY AND SEVERIN, 1896, p. 72.
Tinna grassator: VILLIERS, 1949a, p. 318 (footnote).

A specimen of this apterous North African species collected in Japan has been examined and compared with an individual from Algeria. The North African specimen is stramineous, with rather pale ochraceous pattern elements. In the Japanese specimen (fig. 60A, B), the pattern elements are strongly contrasting, fuscous to piceous on stramineous background. No morphological differences could be found between the two specimens, but the pygophore of the Japanese insect could not be examined. The possibility of mislabeling of the specimen collected in Japan is excluded; the collector himself has sent it to me. There is no doubt that Japan

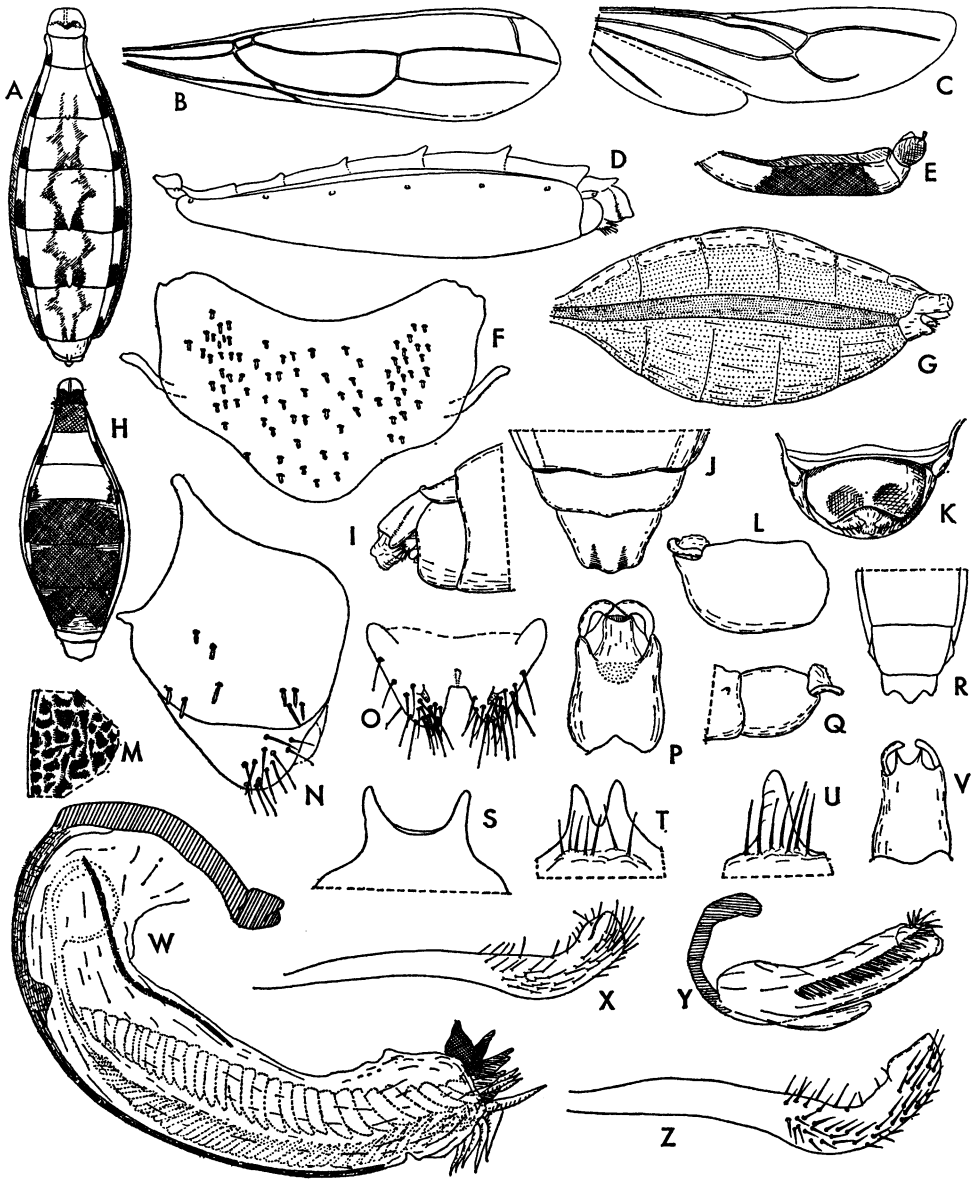


FIG. 61. A. *Tinna gracilis*, abdomen of female, dorsal view, with color pattern. B, C. *Tinna picta*. B. Forewing. C. Hind wing. D. *Tinna gracilis*, abdomen of female, lateral view. E. *Tinna picta*, abdomen of male, lateral view, with color pattern. F, G. *Tinna ventricosa*. F. Ninth tergite, as seen on slide mount. G. Abdomen of female, side view. H–M. *Tinna keiensis*. H. Abdomen of female, dorsal view, with color pattern. I. Apex of abdomen of female, lateral view. J. Genital region of female, dorsal view. K. Genital region of female, seen from behind. L. Pygophore, lateral view. M. Sculpture of anterior tergites, high magnification. N, O. *Tinna ventricosa*. N. Gonocoxite with gonapophysis. O. Syngonapophysis. P. *Tinna keiensis*, pygophore, dorsal view. Q. *Tinna picta*, genital region of male, lateral aspect. R. *Tinna berlandi*, apex of abdomen of female, dorsal view. S. *Tinna picta*, process of pygophore, high magnification. T. *Tinna gracilis*, process of pygophore, high magnification. U. *Tinna keiensis*, process of pygophore, high magnification. V. *Tinna picta*, pygophore, posteroventral view. W, X. *Tinna gracilis*. W. Phallus, lateral view. X. Paramere. Y. *Tinna picta*, phallus, lateral aspect. Z. *Tinna keiensis*, paramere.

is outside the natural range of the clearly African *Tinna*, and that the Japanese specimen demonstrates the capacity for passive dispersal of *Tinna grassator*. Its presence on the Canary Islands (Noualhier, 1893) is almost certainly secondary also.

MATERIAL EXAMINED: *Algeria:* Colomb Bechar, 1948 (B. Malkin; the California Academy of Sciences), one male. *Japan:* Kyushu: Kurume, November 15, 1948 (Miyamoto; collection Miyamoto), one male.

DISTRIBUTION: Algeria; Libya; Canary Islands; secondarily, Japan.

TYPE: Unknown.

Tinna keiensis Wygodzinsky

Figures 60D, F, L; 61H–M, P, U, Z

Tinna keiensis WYGODZINSKY, 1958a, p. 133, figs. 71–83.

This is the only known species of the genus in which the pygophore has a single median process (fig. 61U). Other details are also illustrated here.

DISTRIBUTION: South Africa (Cape Province).

TYPE: Male, Zoological Institute, University, Lund.

Tinna maculipes Miller

Tinna maculipes MILLER, 1950, p. 193, figs. 5a–5i.

If Miller's figures are correct, this species is unique because of its very short first and third rostral segments, with the second much longer than either of the former.

DISTRIBUTION: Rhodesia.

TYPE: Male, British Museum (Natural History).

Tinna nimbana Villiers

Tinna nimbana VILLIERS, 1963, p. 556, figs. 38–42.

DISTRIBUTION: Guinea.

TYPE: Female, Muséum National d'Histoire Naturelle.

Tinna obockiana Villiers

Tinna obockiana VILLIERS, 1949a, p. 321, figs. 140–143.

DISTRIBUTION: French Somaliland.

TYPE: Male, Muséum National d'Histoire Naturelle.

Tinna picta Wygodzinsky

Figures 60E, M, Q–U; 61B, C, E, Q, S, V, Y

Tinna picta WYGODZINSKY, 1958a, p. 135, figs. 84–100.

This species is peculiar because of its contrasting color pattern; some of its characters are illustrated here.

DISTRIBUTION: South West Africa; South Africa (Cape Province).

TYPE: Male, Zoological Institute, University, Lund.

Tinna serratifemora Hesse

Tinna serratifemora HESSE, 1925, p. 93, pl. 4, figs. 5, 5a.

Tinna serratifemorata (*sic*) VILLIERS, 1949a, p. 324.

DISTRIBUTION: South West Africa.

TYPE: South African Museum.

Tinna spinicollis Jeannel

Figure 59A–R

Tinna spinicollis JEANNEL, 1919, p. 156, fig. 9, pl. 5, fig. 8.

The specimen now examined, a winged male, agrees well with the former descriptions of *spinicollis*, based on an apterous male. Its main characters are illustrated here; the figures are self-explanatory and serve to demonstrate some of the interspecific variability in the genus.

MATERIAL EXAMINED: Tanganyika: Matengo-Hochland: Langino, west-southwest of Songea, December 21–31, 1935, 1500 meters (Zerny; Naturhistorisches Museum, Vienna), one male.

DISTRIBUTION: Kenya; Tanganyika.

TYPE: Male, Muséum National d'Histoire Naturelle.

Tinna ventricosa Wygodzinsky

Figures 60C, H, N–P; 61F, G, N, O

Tinna ventricosa WYGODZINSKY, 1958a, p. 139, figs. 101–113.

Tinna ventricosa, here partially illustrated, is characterized by the membranous abdomen of the female, the shape of the head, and the peculiarly shaped setae of the forelegs.

DISTRIBUTION: South West Africa.

TYPE: Female, Zoological Institute, University, Lund.

Tinna wagneri Villiers

Tinna wagneri VILLIERS, 1949a, p. 322, figs. 144, 145.

DISTRIBUTION: South Africa (Transvaal).

TYPE: Male, Muséum National d'Histoire Naturelle.

Tinna zonata Miller

Figure 60I

Tinna zonata MILLER, 1954b, p. 393, figs. 1A–1E.

Tinna zonata was compared by its author (Miller, 1954b) to *berlandi*, but it seems to be more nearly related to *obockiana*, which is also closer geographically. One of Miller's original figures is here reproduced.

DISTRIBUTION: Aden; Yemen.

TYPE: Male, British Museum (Natural History).

TINNATUNGA, NEW GENUS

DESCRIPTION: Macropterous or apterous. Small-sized species (6–8 mm.).

Body surface dull to shining, minutely reticulate. General color brownish, with conspicuous dark and light pattern elements.

Macropterous male: Head fusiform, anteocular portion strongly narrowed anteriorly, much longer than postocular, the latter subglobular, truncate behind in dorsal and lateral views. Interocular furrow situated at level of center of eyes, not extending behind level of their posterior border. Eyes very large. Under surface of head with three pairs of spines. Rostrum slender, not bent between first and second segments, the basal segment with one pair of upwardly directed spines; first segment slightly surpassing level of antenniferous tubercles, second attaining level of center of eyes, slightly shorter than first; third slightly longer than first. Antennae inserted at middle of anteocular portion of head; first and second segments with very long hairs.

Pronotum completely covering mesonotum, with a conspicuous constriction between fore and hind lobe. Fore lobe subglobular, hind lobe bell-shaped. Scutellum and metanotum lacking processes or spines. Upper portion of anterior acetabula with a conspicuous spinelike projection. Posterior border of prosternum rounded.

Forelegs stout. Coxa on anterior surface submedially with one short spine and on inner surface subapically with several. Trochanter with several slender spines. Femur with three series of spines. Posteroventral series beginning at base of article, consisting of several large and numerous medium-sized and short spines inserted on short, wartlike bases. Anteroventral series beginning somewhat apicad of base of posteroventral series, not interrupted at base, consisting of a small number of somewhat irregularly arranged and widely spaced, medium-sized spines similar to those of posteroventral series. Accessory series beginning apicad of base of anteroventral series, consisting of numerous very short spines. Tibia stout, half as long as femur, ventrally with two rows of very slender, suberect, spiniform setae, extreme apex with a few strongly sclerotized denticles. Tarsus as long as tibia, curved, not segmented, almost bare above and at sides; inner surface of basal fourth with a field of numerous short bristles; ventral surface along its entire length with one row of strongly sclerotized small denticles and one row of slender, adpressed, spiniform setae. A single claw, curved, simple in structure. Mid and hind legs slender, femora surpassing apex of abdomen. Femora and tibiae with short, simple setae of uniform size. Tarsi of mid and hind legs two-segmented, basal segment much shorter than apical, with simple setae. Claws simple.

Forewing with discal cell as usual for tribe, its posterior basal angle connected to submarginal vein by an oblique cross vein; another cross vein connecting submarginal vein to M-Cu slightly basad of anterior basal angle of discal cell. Apex of pterostigma falling considerably short of wing tip. Hind wings with hamus approaching Sc+R gradually, joining it on apical third. M-Cu cross vein broadly curved; Cu extending beyond cross vein, connected to R+M by an additional cross vein. Anal lobe normally developed, half as long as wing.

Abdomen slender, fusiform, distinctly narrowed at base. Eighth sternite small. Pygophore with a small, pointed process arising from its posterosuperior border; anterior dorsal bridge short. Parameres slender,

curved apically. Phallus symmetrical. Phallobase membranous, very faintly sclerotized ventrally along middle. Endosoma with numerous simple, symmetrically arranged, spinelike projections.

Apterous female: General characters like those of winged male. Eyes small. Pronotum only slightly longer than wide, conspicuously narrowed posteriorly; hind lobe very short, not distinctive, leaving mesonotum entirely exposed. Mesonotum slightly longer than wide, metanotum shorter than mesonotum, as long as wide.

Abdomen fusiform, broadly inserted on thorax; several tergites tuberculate at middle. Eighth tergite very short, transverse, rounded behind, subhorizontal. Ninth tergite subrectangular, almost vertical.

TYPE SPECIES: *Tinnatunga olsufievi*, new species.

ETYMOLOGY: From *Tinna* and *Orthunga*, genera of the Emesinae.

DISTRIBUTION: Madagascar.

OBSERVATIONS: *Tinnatunga* is allied to *Tinnunga*. Both genera, which are restricted to Madagascar, have retained spines on the under surface of the head, on the upper surface of the rostrum, and on the fore coxae. They share these characters with the Australian *Armstrongula*, but differ from it by their specialized fore tarsi which are not segmented (three-segmented in *Armstrongula*). *Tinnatunga* and *Tinnunga* share two-segmented mid and hind tarsi, an apomorphic feature unique in the subfamily, which seems to indicate that the two genera form a monophyletic group.

The pronotum of the winged form of *Tinnatunga* is complete, the venation of the forewings is not modified, the anal lobe of the hind wing is normal in size, and the arrangement of the spines of the posteroventral series of the fore femur is simple. The pronotum of the winged form of *Tinnunga* is reduced, the discal cell of the forewing and the anal lobe of the hind wing are much smaller than usual in the tribe, and several of the basal spines of the posteroventral series of the fore femur are inserted on a common protuberance. When the primitive characters of *Tinnatunga* are contrasted with the derived ones of *Tinnunga*, it must be concluded that *Tinnatunga* is the plesiomorphic, and *Tinnunga* the apomorphic, component of the group.

Tinnatunga olsufievi, new species

Figure 62A–Q

DESCRIPTION: Macropterous male: Length to apex of forewings, 7.2 to 8.0 mm.

General color ochraceous; pattern elements piceous or stramineous (fig. 62A). Head of general body color, lower surface of anteocular region and sides of head with various areas piceous. Rostrum piceous; apical half or third of first and second segments and base and apex of third segment stramineous. Antennae of general body color; first segment with base whitish, a narrow subbasal and a wide apical annulus piceous; base and apex of second segment narrowly whitish, a wide subbasal and a wide subapical annulus piceous. Prothorax piceous; pronotum stramineous along hind border and longitudinally along middle; anterior acetabula and posterior border of prosternum also stramineous; extension of light-colored areas variable. Mesothorax and metathorax piceous; scutellum and metanotum as well as median and posterior acetabula with adjacent regions stramineous. Legs of general body color. Fore coxa with a wide basal and an apical fuscous annulus, about as wide as intermediate ochraceous region. Fore trochanter and base of fore femur stramineous; femur, furthermore, with three piceous annuli, a wide subbasal and submedian and a narrow apical one. Fore tibia stramineous at base, the remainder piceous. Fore tarsus ochraceous. Coxae and trochantera of mid and hind legs stramineous or ochraceous. Femora of second pair of legs with three piceous annuli, one subbasal, one submedian, and one subapical, distance between subbasal and submedian one much less than between latter and subapical one. Apex of femora and base of tibiae of second pair of legs with a narrow white annulus; tibiae, furthermore, with a very narrow subbasal and apical piceous annulus. Color pattern of femora and tibiae of third pair of legs similar but more diffuse. Forewings with light and dark spaces arranged as shown in figure 62A; light-colored portions stramineous or translucent and nacreous;

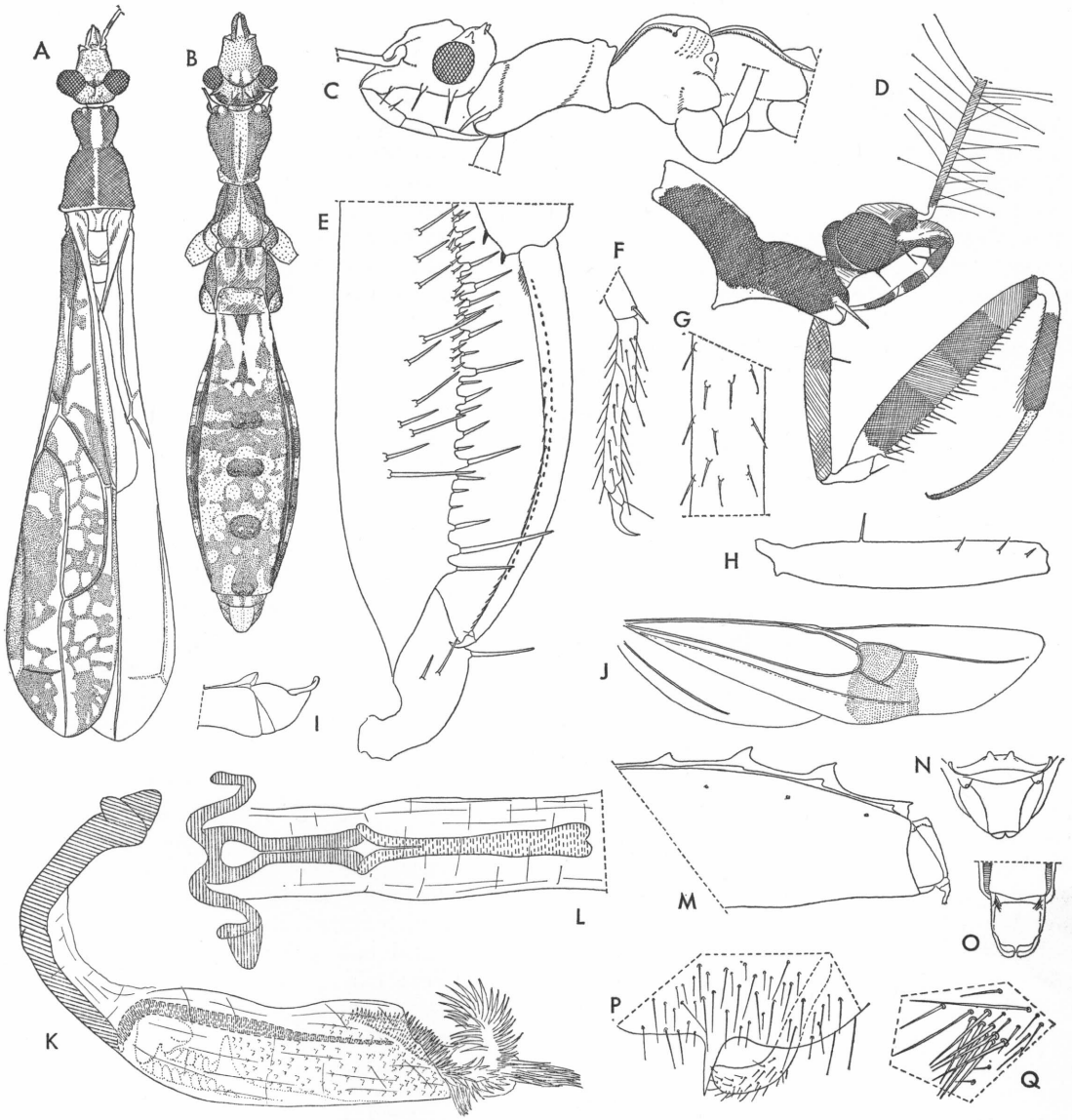


FIG. 62. *Tinnatunga olsufievi*. A. Male paratype, general aspect, with color pattern. B. Female, general aspect, with color pattern. C. Anterior portion of body of female, lateral view. D. Anterior portion of body of male holotype, side view. E. Portion of foreleg. F. Posterior tarsus. G. Detail of posterior femur. H. Inner surface of fore coxa. I. Genital region of male, side view. J. Hind wing of male. K. Phallus, lateral view, endosoma partially evaginated. L. Articulatory apparatus and phallosoma with struts, dorsal view. M. Posterior half of abdomen of female, lateral aspect. N. Genital region of abdomen of female, seen from behind. O. Genital region of male, seen from above. P. Apex of pygophore with one paramere, high magnification. Q. Group of setae at base of pygophore, high magnification.

dark portions ferruginous to castaneous. Hind wings whitish. Abdomen ochraceous.

Body surface shining, mesopleura and metapleura highly polished.

Head and rostrum as given in generic description and shown in figure 62A, D. Eyes very large, attaining level of ventral and dorsal surface of head in lateral view; their distance dorsally equal to two-thirds of their width. Head sulcate longitudinally before and behind interocular furrow, with 1+1 faint elevations situated immediately before and behind transverse furrow. Median and posterior spines of under surface of head subequal in length, those of anterior pair much shorter, as long as rostral spines. Antennae delicate, first and second segments with very long hairs in moderate number (fig. 62D). Length of first antennal segment, 4.5; of second, 3.6 mm.

Thorax as given in generic description and shown in figure 62A, D. Fore lobe of pronotum sulcate longitudinally along middle, hind lobe with a faint, median, longitudinal depression. Fore lobe slightly rugose, hind lobe minutely rugose-tuberculate, with numerous fine hairs.

Forelegs as given in generic description and shown in figure 62D, E, H. Coxa about two-thirds as long as prothorax, with one strong spine on basal third of dorsal surface and two or three smaller spines on inner surface subapically. Trochanter below with one strong spine inserted on a wartlike tubercle, and two shorter spines on inner surface. Femur six times as long as wide. Posteroventral series composed of six or seven long, and about 15 to 20 medium-sized and short, spines, all strongly sclerotized; second long spine from base generally obliquely inclined toward apex of segment. Anteroventral series consisting of 12 to 15 irregularly arranged, slender, medium-sized spines. Accessory series composed of approximately 35 somewhat irregularly arranged spinulets. Tibia and tarsus of forelegs as given in generic description and shown in figure 62E. Posterior femora surpassing wing tip by 1.5 to 2.0 mm. Structure and chaetotaxy of mid and hind legs as given in generic description and shown in figure 62F, G.

Forewings surpassing apex of abdomen by 1 mm.; their entire surface minutely honeycombed. Venation of fore and hind wings as given in generic description and shown in figure 62A, J.

Abdomen as given in generic description; segmental limits distinct. Tergites and sternites with macrochaetae and microchaetae (fig. 62P). Abdominal apex as shown in figure 62I, O. Seventh tergite very shortly salient at middle behind, covering only extreme base of pygophore. Latter dorsally at base on each side with a cluster of strongly sclerotized setae (fig. 62 O, Q); posterior process and parameres as shown in figure 62P. Phallus as given in generic description and shown in figure 62K, L.

Apterous female: Length, 6.2 mm. General characters like those of male.

Coloring (fig. 62B) similar to that of male, especially on head, rostrum, antennae, and legs. Prothorax piceous; hind border and a wide stripe dorsally along middle ochraceous; acetabula stramineous. Mesonotum and metanotum ochraceous, variously suffused with castaneous and piceous; pleura and sterna piceous; median acetabula partly, posterior acetabula entirely, stramineous. General color of abdomen ochraceous, stramineous on basal fourth above; dorsal and ventral surface variegated with dark (fig. 62B). Connexivum alternately dark and light, darker portions more extensive than lighter.

Body surface slightly shining, sides of head and thorax polished.

Head and rostrum as shown in figure 62B, C. Eyes small, their distance dorsally only slightly less than twice their width; subcircular in lateral view, remote from level of ventral and dorsal surface of head. Dorsal surface of head like that of male, but the 1+1 elevations situated before transverse furrow more distinct; 2+2 well-developed, conical tubercles arranged in a transverse row behind interocular furrow. First and second antennal segments bare; length of first segment, 3.5; of second, 2.6 mm.

Structure of thorax as given in generic description and shown in figure 62B, C. Fore lobe of pronotum delicately sulcate along middle, sulcus not attaining very short hind lobe. Mesonotum and metanotum convex above, with a distinct, median, longitudinal furrow.

Structure of legs like that of male, but

segments stouter; anterior femur only five times as long as wide.

Abdomen as given in generic description and shown in figure 62B, M, N. Segmental limits not perceptible. Posterolateral angles of fifth to seventh connexival segments shortly salient, those of sixth and seventh distinctly pointed. Fourth to seventh tergites bituberculate posteriorly in middle; tubercles of fourth tergite smallest, others subequal in size. Genitalia as illustrated (fig. 62M, N); ninth tergite delicately wrinkled transversely.

MATERIAL EXAMINED: Madagascar: Périnet December, 1932 (Olsufiev; Zoological Institute of the Academy of Sciences, Leningrad), one male holotype, one female allotype; Périnet, February and March, 1935 (Olsufiev; Zoological Institute of the Academy of Sciences, Leningrad), one male paratype; (Olsufiev; the American Museum of Natural History), one male paratype.

OBSERVATIONS: This species, named for its collector, seems to be somewhat variable. The holotype male is characterized by a considerable extension of the whitish area at the hind border of the pronotum (fig. 62D) and by the spines of the fore femur which are rather numerous and invariably shorter than the diameter of this segment. In the two male paratypes, the whitish area on the pronotum is much less extensive (fig. 62A), and the spines of the fore femur are less numerous, with the larger ones as long as, or even longer than, the diameter of the segment; in respect to the fore femora, the allotype female resembles the male paratypes. There are also slight differences in the wing pattern between the holotype and the two paratypes.

TINNUNGA, NEW GENUS

DESCRIPTION: Macropterous male: Small species (5–6 mm.).

Body surface dull to subshining, delicately and inconspicuously granulated or striate; without long hairs. Body color uniformly yellowish, lacking conspicuous pattern elements.

Head subglobular; anteocular portion strongly narrowed anteriorly, longer than postocular, latter truncate behind in dorsal and lateral views. Interocular furrow situated somewhat behind level of center of eyes, not extending behind level of their posterior border. Eyes very large. Under surface of head with three pairs of spines. Rostrum slender, not bent between first and second segments, second with one pair of upwardly directed spines; first segment attaining level of anterior border of eyes; second slightly shorter than first, reaching to level of center of eyes; third longer than first. Antennae inserted at middle of anteocular portion of head; first and second segments with very long hairs.

Pronotum not covering mesonotum, about as long as wide. Upper portion of anterior acetabula with a spiniform process. Scutellum and metanotum lacking spine. Posterior border of prosternum emarginated.

Forelegs rather stout. Coxa on inner surface subapically with a few short spines. Trochanter with several slender spines. Femur with three series of spines. Posteroventral series beginning at base of article, with several large spines inserted on a common short process, followed by slender, long to medium-sized spines inserted on short, wartlike bases. Anteroventral series beginning somewhat apicad of level of posteroventral series, not interrupted at base, consisting of medium-sized to short slender spines. Accessory series beginning at level of base of posteroventral series, composed of short spines. Tibia very stout, half as long as femur, ventrally with two rows of very slender, suberect, spiniform setae; a short spine at apex of ventral surface. Tarsus as long as tibia, curved, not segmented; almost bare above and laterally; inner surface on basal third with a row of short spines; ventral surface with one series of slender, adpressed, spinelike setae and a row of very small, strongly sclerotized, rounded denticles. A single claw, curved, simple in structure. Mid and hind legs slender but short, posterior femora not surpassing apex of forewings. Femora with numerous spinulets, tibiae with short setae of uniform size. Tarsi of mid and hind legs two-segmented, basal segment slightly shorter than apical, both with numerous slender setae; claws simple.

Forewings with discal cell as usual for the tribe but unusually short; only its posterior basal angle connected by a short cross vein to submarginal vein. Apex of pterostigma falling considerably short of wing tip. Hind wings with hamus approaching Sc+R only

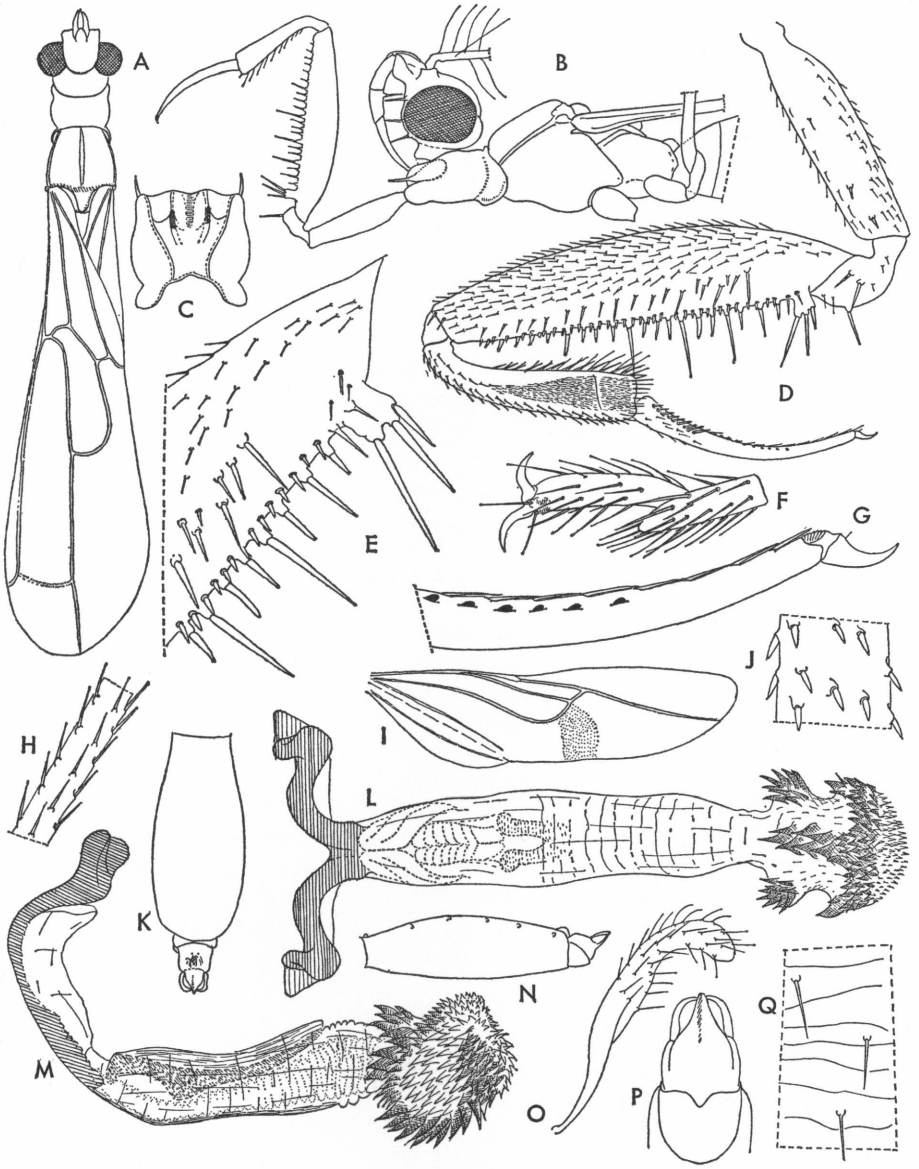


FIG. 63. *Tinnunga macneilli*, male. A. General aspect. B. Anterior portion of body, side view. C. Prothorax, ventral view. D. Foreleg. E. Base of fore femur. F. Posterior tarsus. G. Apical half of fore tarsus. H. Portion of hind tibia. I. Hind wing. J. Portion of posterior femur. K. Abdomen, dorsal view. L. Phallus, dorsal view, endosoma completely everted. M. Phallus, lateral aspect, endosoma completely everted. N. Abdomen, lateral aspect. O. Paramere. P. Genital region, inferoposterior view. Q. Setae of abdominal sternite.

very gradually, joining latter only on basal half. M-cu cross vein broadly curved; Cu not extending beyond cross vein. R+M projecting from level of cross vein to wing tip, simple. Anal lobe very narrow, less than half as long as wing.

Abdomen very wide, broadly connected to thorax. Eighth sternite well developed. Pygophore with a large, pointed projection arising from its inferoposterior border; anterior dorsal bridge short. Parameres slender, curved apically. Phallus symmetrical. Basal plates

widely diverging. Phallobase membranous, slightly sclerotized ventrally along middle. Spinelike projections of endosoma simple, arranged symmetrically.

TYPE SPECIES: *Tinnunga macneilli*, new species.

ETYMOLOGY: From *Tinna* and *Orthunga*, genera of the Emesinae.

DISTRIBUTION: Madagascar.

OBSERVATIONS: *Tinnunga* is closely related to *Tinnatunga*, equally restricted to Madagascar. The two genera agree in a specialized character, the two-segmented mid and hind tarsi. Their affinities are discussed in more detail under *Tinnatunga*.

Tinnunga macneilli, new species

Figure 63A–Q

DESCRIPTION: Macropterous male: Length to apex of forewing, 5.5 mm.

General body color ochraceous; head dorsally, mesonotum and metanotum, antennae, mid and hind legs, and forewings fulvous.

Head and rostrum as given in generic description and shown in figure 63A, B; surface of head microscopically striate. Eyes very large, almost attaining level of dorsal and ventral surface of head in lateral view; their distance dorsally slightly larger than their width (1.15/1). Antennae delicate, first and second segments with very long hairs in moderate number (fig. 63B), third and fourth only shortly pilose. Length of first segment, 3.0 mm.; relative length of segments, 1/0.9/0.13/0.27.

Thorax as given in generic description and shown in figure 63A–C. Pronotum subcircular in dorsal view; spinelike projections of upper portion of anterior acetabula very elongate. Mesonotum approximately as long as wide, its disc convex, longitudinally sulcate along middle.

Forelegs as given in generic description and shown in figure 63B, D, E, G. Coxa as long as mesonotum and scutellum combined, subapically on inner surface with two short spines. Trochanter with one ventral and one to two lateral spines. Femur about seven times as long as wide. Basal process laterally compressed, as wide as high, apically with two long and one to two short spines. Posteroventral series composed of four to five long and about 15 shorter spines, long ones less, short ones more, strongly sclerotized. Anteroventral series with about 25 spines; accessory series with approximately 30 spinulets, two or three basal ones longer than remainder. Tibiae and tarsus as given in generic description and illustrations. Posterior femur attaining wing tips. Structure and chaetotaxy of mid and hind legs as given in generic description and shown in figure 63F, H, J.

Forewings surpassing apex of abdomen by 1.5 mm.; their entire surface minutely honeycombed. Venation of fore and hind wings as given in generic description and shown in figure 63A, I.

Shape of abdomen as shown in figure 63K, N; segmentation difficult to observe. Tergites and sternites with short setae of uniform size (fig. 63Q); tergites delicately striate transversely. Seventh tergite rounded posteriorly, covering only extreme base of pygophore. Eighth sternite deeply emarginated at center behind (fig. 63P). Shape of pygophore and shape and chaetotaxy of parameres as shown in figure 63 O, P. Phallus as given in generic description and shown in figure 63L, M.

MATERIAL EXAMINED: Madagascar: Antanemora, 300 meters, December 11, 1959 (E. S. Ross; Muséum National d'Histoire Naturelle), one male holotype.

OBSERVATIONS: This species is named for my friend Dr. Donald MacNeill in acknowledgment of his continued interest in my work.

LEISTARCHINI INCERTAE SEDIS

Luteva alleni Fernando

Luteva alleni FERNANDO, 1964, p. 126, pl. 2, fig. 11.

The description is cursory and accompanied by a poor habitus drawing; the specimen is obviously a leistarchine nymph, of doubtful generic affinities.

DISTRIBUTION: Ceylon.

TYPE: Unknown.

Nesita annulosus Bergroth

Nesita annulosus BERGROTH, 1906a, p. 309.

As explained under the heading of *Nesita*, *annulosus* does not belong in this genus. Owing to lack of more precise data, it cannot be placed at this time.

DISTRIBUTION: Madagascar.

TYPE: Unknown.

PLEIAS KIRKALDY

Pleias KIRKALDY, 1901, p. 56.

As the genus could not be examined, the original description is here transcribed: "*Ad sectionem* Leistarcharia *Stali pertinens*, Lutevae *Dohrni affinis, per tibiarum ac tarsorum anticorum longitudinem proportionalem distinguendus.*"

Closely allied to *Luteva* but much shorter in proportion and the pronotum much shorter and broader. Segments of rostrum subequal (first very slightly shorter than second which is slightly shorter than third). Eyes fairly large. Anterior lobe of pronotum longer than posterior. Metasternum carinate longitudinally. Anterior tibia and tarsus together subequal to femur (femur 24, tibia 15, tarsus 10). Posterior femora extending beyond apex of abdomen. Apical margins of abdominal segments straight.

TYPE SPECIES: *Pleias ritsemae* Kirkaldy (monobasic).

DISTRIBUTION: Sumatra.

Bergroth (1906a) thought that *Pleias* might be a synonym of *Ploiaria* (as *Luteva*). No opinion is advanced in the present paper.

Pleias ritsemae Kirkaldy

Pleias ritsemae KIRKALDY, 1901, p. 56.

The very short specific description is of no assistance in solving the riddle of the systematic position of *Pleias*.

DISTRIBUTION: Sumatra.

TYPE: Rijksmuseum van Natuurlijke Historie.

Ploiaria perfuga Miller

Ploiaria perfuga MILLER, 1941, p. 776, figs. 1a, 1b.

In this species the pronotum covers the mesonotum completely; therefore it is not a *Ploiaria*. *Perfuga* may belong in *Bagauda*, but the description is not detailed enough for the matter to be affirmed or denied.

DISTRIBUTION: Malaya.

TYPE: Female, British Museum (Natural History).

EMESINI AMYOT AND SERVILLE

Emesides AMYOT AND SERVILLE, 1843, p. 393.
Ploiariida (part) STÅL, 1859, p. 328.
Ploeariina (part) STÅL, 1872b, p. 125.
Ploiariaria (part) STÅL, 1874, p. 92.
Stenolemaria (part) KIRKALDY, 1902, p. 152.
Stenolaemaria (part) DISTANT, 1903e, p. 201.
Ploiarioliinae (part) VAN DUZEE, 1916, p. 27.
Stenolaemini (part) VILLIERS, 1948, p. 429.

DESCRIPTION: Small to large-sized species (6.5–23 mm.). Rarely concolorous, generally with conspicuous markings. Setae of mid and hind legs and of abdomen of most genera differentiated into microchaetae and macrochaetae.

Head, rostrum, and fore coxae not spined.

Rostrum generally strongly bent between first and second segments. Ratio of first antennal segment to third, 1/0.25–0.04.

Winged and micropterous or apterous forms known, latter rare; mesonotum of winged form invariably covered by posterior lobe of pronotum; humeral angles in some cases spined. Scutellum and metanotum with or without spines.

Coxae and trochantera of forelegs not spined; spines of femora and tibiae of various types. Fore tibia from slightly to distinctly shorter than femur, but in no case less than half as long as the latter. Fore tarsi very short, hardly longer than mid and hind tarsi, mostly about one-fifth, very rarely about half, as long as tibia. Tarsi three-segmented or two-segmented; in former case, first segment not distinctly shorter than second; tarsus not strongly sclerotized, hairy on all surfaces, segments movably articulated. Claws of fore tarsi subequal in size, inner one with a medially incised ventral lamella, outer one with from two to five or rarely as many as eight small projections on basal half of under surface; arolia elongate. Claws of mid and hind legs on under surface with a medially incised lamella, in some cases with additional specialized processes.

Forewings with either one, two, or three cells, viz., either with discal, basal, and subbasal cells, or with basal or subbasal or both absent; portion of M limiting discal cell inserted on Sc+R. Hind wings with hamus and m-cu cross vein well developed; hamus only very rarely fused shortly to Cu. Anal lobe at least half as long as wing, not lobulate apically. Transverse thickening absent.

Basal abdominal tergite without spine. Last tergite of male, with a single known exception, covering genitalia from above. Phallus from symmetrical to highly asymmetrical.

Phallosoma largely membranous, frequently with projections; endosoma of varied shapes and structures, symmetrical or asymmetrical, with or without conspicuous projections. Female genitalia with third gonapophyses fused to form a syngonapophysis, its posterior border from slightly emarginated to somewhat salient at center.

Male: Testes varying in shape and position. Seminal vesicles tubular. Mesadenia with a single cylindrical lobe.

TYPE GENUS: *Emesa* Fabricius.

DISTRIBUTION: All zoogeographical regions.

OBSERVATIONS: Among the higher Emesinae, the Emesini are in some ways the least-specialized group, as shown by their basic wing venation and the forelegs, which have not suffered extreme modifications. On the other hand, the most striking modifications of the claws are found in this group which possesses the representatives of the subfamily probably best adapted to life in spider webs.

KEY TO THE GENERA OF THE EMESINI

1. Micropterous or apterous (figs. 66I; 72T; 74A; 82B; 101A–G) 19
   Fully winged, at most brachypterous (figs. 65A; 89A; 95A) 2
2. Forewings with a single closed cell (figs. 73G; 75I; 80M; 82L; 93L) 3
   Forewings with one or two smaller cells in addition to large discal cell, thus with two or three cells (figs. 64K; 65P; 72E; 85C; 94C) 5
3. First rostral segment much shorter than second (fig. 73D); anteroventral series of fore femur composed only of delicate, spinelike setae or very small spines, spiniferous processes absent altogether (figs. 73I; 75G); M and Cu completely fused basad of cell (figs. 73G; 75I) . . . . . *Gardena*
   First rostral segment at least as long as second (figs. 82C; 93B); anteroventral series of fore femur composed partly or entirely of spiniferous processes (figs. 80D; 81D; 82I; 93H); M and Cu not fused completely basad of discal cell (figs. 80M; 82L; 93L) 4
4. Scutellum (fig. 93B) and metanotum each with a spine or tubercle; discal cell of forewing pointed basally, with one vein originating from base of cell, vein bifurcate toward axillary region (fig. 93L) . . . . . *Stenolemimus*
   Scutellum and metanotum lacking spines or tubercles; discal cell of forewings with two simple basally directed veins originating from its base (figs. 80M; 82L) . . . . . *Myiophanes* (part)
5. Fore tarsi two-segmented (figs. 94B, H; 97B, E; 98S; 99G) 6
   Fore tarsi three-segmented (figs. 65D, E; 71B, D) 8
6. Forewings with basal and subbasal cell (fig. 97A) . . . . . *Stenolemopsis*
   Forewings with basal cell but without subbasal cell (figs. 94C; 100A–E, G, H) . . 7
7. A short vein emitted from costal margin of discal cell (fig. 100A–E, G, H); posterior lobe of pronotum with 1+1 discal, and often also 1+1 humeral, projections (figs. 98A, M; 99A–C); generally very hairy insects . . . . . *Stenolemus*
   No vein emitted from costal margin of basal cell (fig. 94C); hind lobe of pronotum lacking projections (figs. 94C; 96F); insects not conspicuously hairy . . . . *Stenolemoides*
8. Forewings, in addition to discal cell, with either basal or subbasal cell, thus with two cells only (figs. 64K; 66D; 68A; 72E; 81V; 90A; 91C; 92C) 9
   Forewing, in addition to discal cell, with basal and subbasal cell, thus with three cells (figs. 65A; 71K; 83N) 16
9. Scutellum and metanotum lacking spines (fig. 64C) 10
   Scutellum or metanotum or both with spine (figs. 66B; 68A, B; 89J; 92B) 13
10. Armature of fore femur consisting exclusively of long, spinelike setae inserted on very short inconspicuous bases (fig. 64E, F) . . . . . *Amilcaria*
    At least part of armature of fore femur consisting of conspicuous spiniferous processes (figs. 72D; 80D; 91E) 11
11. First rostral segment at least as long as second (figs. 72B; 81B); spined portion of fore femur occupying most of length of segment (figs. 72C; 80C); anteroventral series composed partly or entirely of spiniferous tubercles (figs. 72D; 80D); forewings with discal and subbasal cell, viz., Pcu cross vein inserted on large cell (figs. 72E; 81K, Q) 12
    First rostral segment much shorter than second (fig. 91B); spined portion of fore femur occupying only about one-half of length of segment (fig. 91D); anteroventral series composed exclusively of delicate, spinelike setae or small spines, spiniferous processes completely absent (fig. 91E); forewings with discal and basal cell, viz., Pcu cross

vein inserted on small cell (fig. 91C) . . . . . *Protogardena*

12. Forewings very narrow; subbasal cell short, one-tenth of length of discal cell (fig. 72E); claws of mid and hind legs with conspicuous, subbasal projection (fig. 72I) . . . . . *Eugubinus*

    Forewings wider, subbasal cell more than one-tenth as long as discal cell (fig. 81K, Q); claws of mid and hind legs lacking said projection (fig. 81I) . . . . . *Myiophanes* (part)

13. Basal cell pentagonal, two basally directed veins emitted from its base (figs. 66D; 67C); Pcu cross vein meeting basal cell near its base (figs. 66D; 67C); claws of mid and hind legs ventrally with a large, lamellar, triangular process (fig. 67J, K) . . . . . *Chinemesa* (part)

    Basal cell quadrangular or triangular, one or two basally directed veins emitted from its base; Pcu cross vein meeting basal cell near or at apex of cell (figs. 68A; 89P; 92C); claws of mid and hind legs lacking large triangular process (fig. 68G) 14

14. Base of basal cell very narrowly truncate, a short free vein emitted from its base in addition to elongate vein leading to axillary region (fig. 70D) . . . . . *Dohrnemesa*

    Base of basal cell pointed, emitting a single longitudinal vein toward axillary region (figs. 89P; 90A; 92C) 15

15. Size, more than 10 mm.; first and second rostral segments subequal in length (fig. 89B, J); pronotum pedunculate, scutellum spined (figs. 89A, B, J, N; 90A, C) . . . . . *Polauchenia*

    Size, less than 10 mm.; first rostral segment much longer than second (fig. 92B); pronotum deeply constricted before middle but not pedunculate, scutellum lacking spine (fig. 92A) . . . . . *Schoutedenocoris*

16. Ocelli present (fig. 65A, B); scutellum with a large spine (fig. 65C) . . . *Armstrongocoris*

    Ocelli and scutellar spine absent (figs. 79B; 87D) 17

17. Pronotum elongate-pedunculate (figs. 71F; 79B) 18

    Pronotum more or less constricted between fore and hind lobe but not pedunculate (figs. 83J; 85C; 86A) . . . *Phasmatocoris*

18. Basal cell distinctly separated from subbasal cell by a short portion of Cu (fig. 79B, M); posteroventral and anteroventral series of fore femur consisting of slender spines inserted on very short, wartlike bases (fig. 79N, O) . . . . . *Mayemesa*

    Basal and subbasal cells adjacent (fig. 71K); posteroventral and anteroventral series of fore femur consisting of short spines inserted on large processes (fig. 71C) . . . . . *Emesa*

19. Hind lobe of pronotum relatively well developed, covering mesonotum to base of scutellum (fig. 101F, G) . . . . . *incertae sedis* (Costa Rica; British Guiana)

    Hind lobe of pronotum abbreviated, covering extreme base of mesonotum only . . 20

20. Mesonotum spined 21

    Mesonotum not spined 22

21. Posterior border of pronotum conspicuously salient at middle (fig. 101E); mesonotal spine small, obliquely inclined posteriorly (fig. 101C); physogastrous female (fig. 101E) . . . . *incertae sedis* (Costa Rica)

    Posterior border of pronotum emarginated, mesonotal spine large, erect (fig. 66I, J); abdomen of female only slightly widened (fig. 66L) . . . . . *Chinemesa* (part)

22. Anteroventral series of fore femur composed exclusively of slender, spinelike setae and small spines (figs. 73I; 74X) . . *Gardena*

    Anteroventral series of fore femur composed partly of spiniferous processes (fig. 72AA) 23

23. Mesonotum and metanotum of equal length, each more than three times as long as wide (fig. 72T); claws of mid and hind legs with conspicuous, pointed projections (fig. 72W) . . . . . *Eugubinus*

    Metanotum distinctly shorter than mesonotum, hardly longer than wide (figs. 82B; 101A); claws of mid and hind legs without long, pointed projections 24

24. First rostral segment much longer than second (fig. 82C); fore tibia three-fourths as long as femur (fig. 82E); abdomen slender-fusiform, posterolateral angles of posterior connexival segments lobate (fig. 82V) . . . . . *Myiophanes* (part)

    First rostral segment not markedly longer than second; fore tibia eight-ninths as long as femur; abdomen physogastrous (fig. 101A), connexival margins entire . . . . . *incertae sedis* (Brazil)

Gardenoides has not been included in the above key, as not enough data were available.

AMILCARIA Wygodzinsky

Amilcaria Wygodzinsky, 1950b, p. 73.

Description: Macropterous female: Medium-sized species (20 mm.).

Moderately slender, body conspicuously marked, legs annulated. Body surface slightly

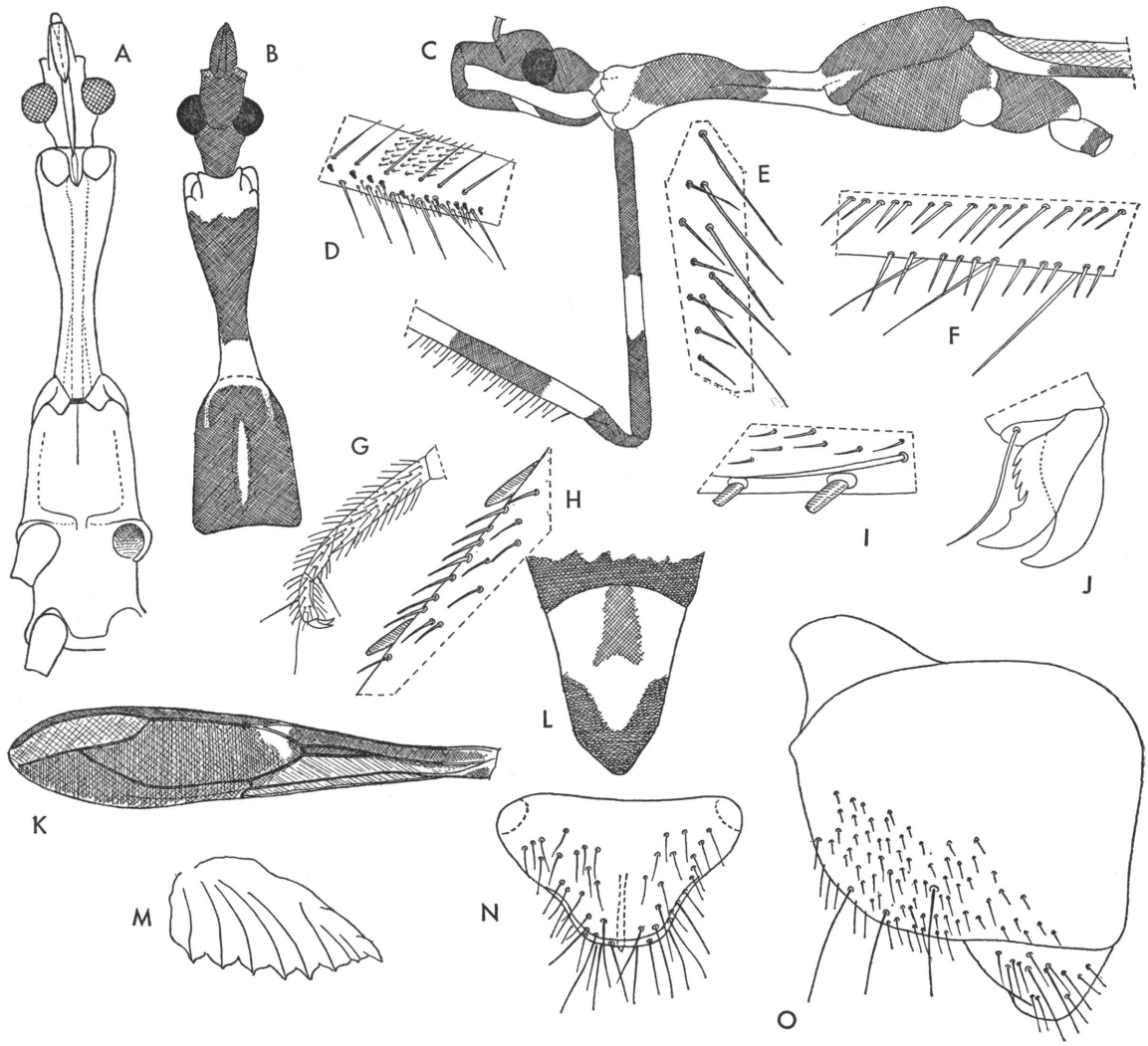


FIG. 64. *Amilcaria lapinhaensis*, female. A. Anterior portion of body, ventral view. B. Head and prothorax, seen from above, with color pattern. C. Anterior portion of body, lateral view, with color pattern. D. Portion of fore tibia. E. Base of posteroventral series of fore femur. F. Spiniform setae of under surface of central portion of fore femur. G. Fore tarsus. H. Detail of hind femur. I. Detail of hind femur, high magnification. J. Praetarsus and claws of foreleg. K. Forewing, with color pattern. L. Apex of abdomen, dorsal view, with color pattern. M. Posterior gonapophysis. N. Syngonapophysis. O. Gonocoxite with gonapophysis.

shining, lacking conspicuous pubescence.

Head fusiform, very elongate, anteocular distinctly longer than postocular region; sides of postocular slightly converging posteriorly. Interocular furrow situated somewhat behind level of center of eyes; latter large, attaining level of ventral surface of head. Rostrum strongly bent between first and second segments; first segment somewhat shorter than anteocular region, second slightly longer, third longest, conspicuously curved. Insertion of antennae situated nearer to anterior border of eye than to apex of head.

Pronotum completely covering mesonotum, elongate, pedunculate, fore lobe not sharply separated from pedunculate portion; hind lobe lacking projection. Scutellum and metanotum lacking spines.

Forelegs slender. Coxa and trochanter simple. Femur parallel-sided, ventrally with two series of slender, spiniform setae not inserted on distinct bases. Posteroventral series beginning at base of article, composed of two very closely approximated rows, one consisting of short, other of long, spinelike setae. Anteroventral series beginning at some distance from base of article, not interrupted, composed of a single row of spinelike setae. Fore tibia three-fourths as long as femur, ventrally with one row of short, strongly chitinized, peglike spinulets accompanied on each side by a row of long setae. Fore tarsus very short; tibia and tarsus together shorter than femur. Tarsus three-segmented, weakly chitinized, hairy on all surfaces; basal segment longest, second and third subequal in size. Claws subequal in size, outer one with several short, subbasal processes. Mid and hind legs very long and slender, femora of both pairs considerably surpassing apex of abdomen, with short, delicate hairs, dorsally with short, blunt spines. Basal segment of mid and hind tarsi longer than either second or third.

Forewings with large discal and narrow subbasal cell. Pterostigma carried to apex of wing. Hind wings not examined.

Abdomen slender, elongate, its outlines continuous. Gonocoxites not wider than long, with numerous microchaetae and a few macrochaetae. Syngonapophysis subtrapezoidal, truncate apically.

TYPE SPECIES: *Amilcaria lapinhaensis* Wygodzinsky (monotypic).

DISTRIBUTION: Brazil.

OBSERVATIONS: As no male of *Amilcaria* could be examined, it is difficult to state the possible relationships of the genus. The peculiar armature of the fore femora and the presence of spines on the dorsum of the mid and hind femora are sufficient to distinguish *Amilcaria* from other genera that share certain key characters with it, such as *Myiophanes* and especially *Eugubinus*.

Amilcaria lapinhaensis Wygodzinsky

Plate 2, figure 1; text figure 64A–O

Amilcaria lapinhaensis WYGODZINSKY, 1950b, p. 74, figs. 1–17.

This species is known from a single specimen only, which was collected in a cave. Most of its characters are illustrated here.

DISTRIBUTION: Brazil (Minas Geraes).

TYPE: Female, Instituto Oswaldo Cruz.

ARMSTRONGOCORIS WYGODZINSKY

Armstrongocoris WYGODZINSKY, 1949a, p. 217.

DESCRIPTION: Macropterous male: Medium-sized species (14 mm.).

Body stout; dark, with few light-colored elements. Body surface subshining, virtually bare.

Head relatively short, anteocular region slightly longer than postocular, sides of anteocular subparallel, postocular subglobular, but sides not abruptly constricted before neck. Interocular furrow strongly curved backward medially, not attaining level of posterior border of eyes; latter small, not attaining level of dorsal or ventral surface of head. Ocelli present, well developed. Rostrum slender, bent between first and second segments; first almost as long as anteocular portion, second distinctly shorter than first, third longest. Insertion of antennae situated near apex of head.

Pronotum completely covering mesonotum, short and wide, constricted between anterior and posterior lobe, but not pedunculate; fore lobe with a median longitudinal furrow, hind lobe lacking processes. Scutellum with a large, erect spine, metanotum lacking process.

Forelegs rather stout, with two series of processes. Posteroventral series starting at base of segment, composed of spiniferous processes of roughly two sizes, these processes decidedly shorter than diameter of segment, apical spine much shorter than process. Anteroventral series equally beginning at base of article, interrupted basally, composed of spiniferous processes similar to those of posteroventral series, but smaller. Fore tibia almost as long as femur, ventrally with one row of small, toothlike spines. Fore tarsus one-eighth as long as tibia, three-segmented, segments subequal in size, hairy on all surfaces. Two well-developed claws, outer one ventrally with several small processes, inner one with a medially incised, ventral lamella. Mid and hind legs of moderate length, posterior femur surpassing apex of abdomen; tarsi simple, three-segmented, segments of

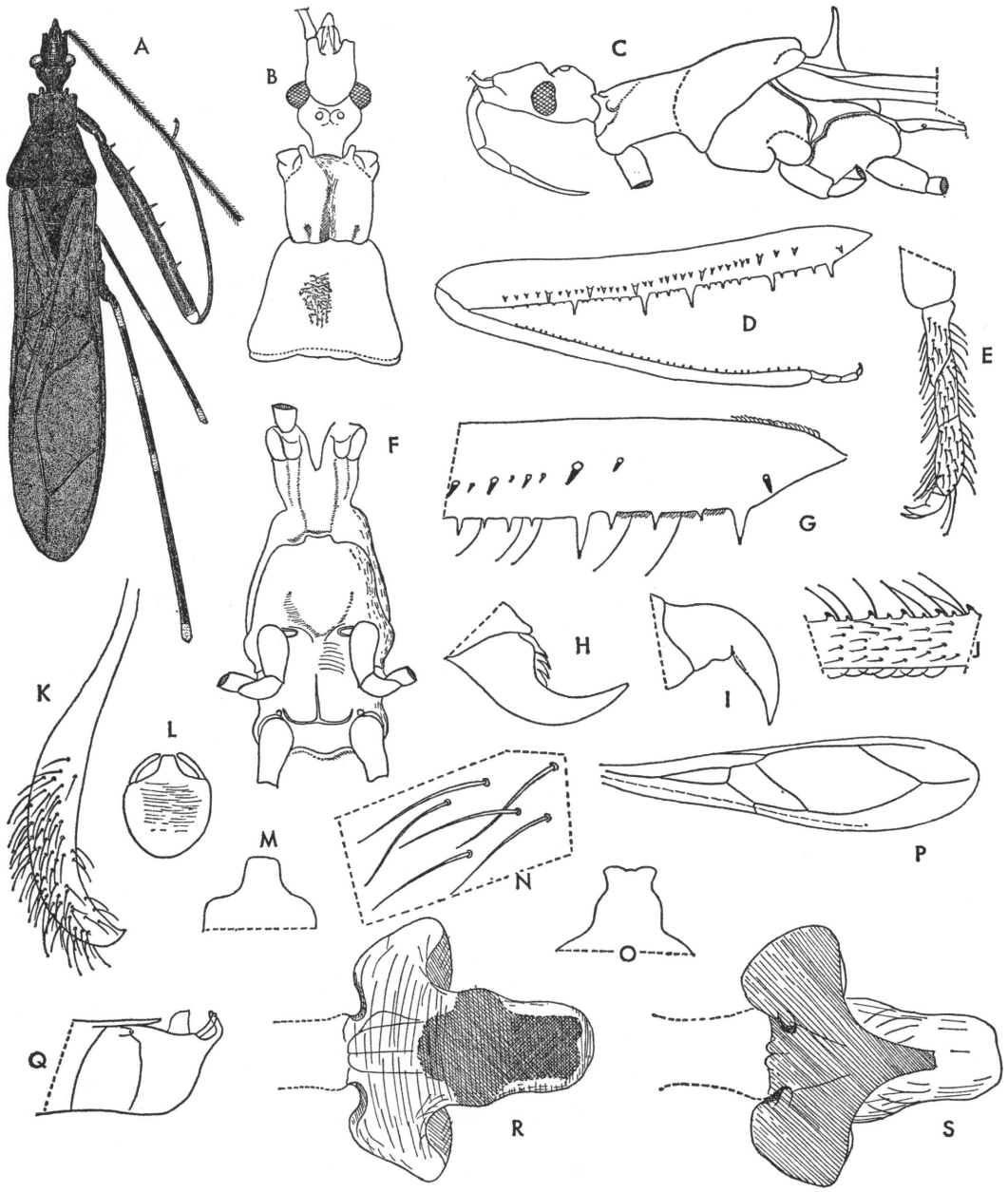


FIG. 65. *Armstrongocoris singularis*, male. A. General aspect, with color pattern. B. Head and prothorax, seen from above. C. Anterior portion of body, lateral view. D. Femur, tibia, and tarsus of foreleg. E. Fore tarsus. F. Thorax, ventral view. G. Base of fore femur. H, I. Claws of foreleg. J. Portion of fore tibia. K. Paramere. L. Pygophore, seen from behind. M. Posterior process of pygophore. N. Setae of pygophore. O. Process of pygophore, as seen on slide mount. P. Forewing, schematic. Q. Apex of abdomen, lateral view. R. Phallosoma, ventral aspect. S. Phallosoma, dorsal view.

subequal size; claws ventrally with medially incised lamella.

Forewings with discal, basal, and subbasal cell; Pcu meeting basal cell at level of center of cell. Pterostigma not reaching wing tip. Hind wings not examined.

Abdomen slender, its outlines continuous. Pygophore subsemicircular in lateral view; posterior process broad, platelike. Parameres slender, elongate, pointed apically. Phallus symmetrical. Phallotheca with broad, flaplike extensions laterally near base, and with conspicuous extensive dorsal and ventral chitinizations. Endosoma apparently lacking sclerotized processes.

TYPE SPECIES: *Armstrongocoris singularis* Wygodzinsky (monobasic).

DISTRIBUTION: Australia.

OBSERVATIONS: This genus is the only member of the Emesinae in which ocelli have been found, but there is nothing that would cast doubt on the systematic position of the genus. Within the tribe Emesini, *Armstrongocoris* must be considered as definitely plesiomorphic. This fact is not necessarily suggested by the presence of ocelli, but by its relatively stout body and short legs, the simple pronotum, the well-developed scutellar spine, the generalized structure of the forelegs, and the three well-developed cells of the forewing.

Armstrongocoris singularis Wygodzinsky

Figures 5F; 65A–S

Armstrongocoris singularis WYGODZINSKY, 1949a, p. 218, figs. 1–19.

The general aspect and morphological details are illustrated here.

DISTRIBUTION: Australia (New South Wales).

TYPE: Male, Australian Museum.

CHINEMESA, NEW GENUS

DESCRIPTION: Macropterous or apterous. Medium-sized species (13–17 mm.).

Body surface shining; short bristles and isolated longer hairs present. General color brownish, with not very conspicuous light and dark markings.

Macropterous male: Head elongate-fusiform, anteocular longer than postocular region, sides of latter gradually converging posteriorly. Eyes medium-sized to large; interocular furrow situated slightly behind level of center of eyes, only faintly backwardly curved. Rostrum conspicuously bent between first and second segment; all segments subcylindrical. First and second segments subequal in length, second attaining level of center of eyes; third much longer than first or second. Antennae inserted slightly before middle of anteocular portion.

Pronotum completely covering mesonotum, strongly constricted at or behind middle but not pedunculate. Anterior lobe gradually narrowing posteriorly, posterior lobe bell-shaped, lacking spines or projections. Scutellum with a long spine; metanotum lacking projection.

Forelegs very slender. Femur with two series of spines or spiniferous processes, which are lacking on basal fifth of article. Posteroventral series composed of approximately 10 larger and very numerous smaller processes, large ones combined with their apical spines much shorter than diameter of femur, large basal process smaller than some of others. Anteroventral series beginning somewhat apicad of base of other series, not interrupted at base, composed of short spines lacking basal tubercles, intermixed with long, strong setae; latter also interspersed among processes of posteroventral series. Tibia slender, about three-fourths as long as femur, ventrally with two series of short denticles interspersed with long, slender setae. Tarsus about one-seventh as long as tibia, three-segmented, segments subequal in size, only weakly sclerotized, hairy on all surfaces. Claws subequal in size, outer one ventrally with three short projections on basal half, inner one with a median ventral incision. Mid and hind legs long and slender, posterior femora considerably surpassing apex of abdomen. Femora and tibiae with a single type of setae only, those of femora short, those of tibiae more elongate and slender. Segments of mid and hind tarsi subequal in length; claws with a large, triangularly projecting, lamellar, ventral process.

Forewings simply rounded apically, with discal and basal cell. M and Cu separate basad of basal cell, M relatively short, free-ending, Cu attaining axillary region. Pcu meeting basal cell nearer to base than to apex of cell. Hind wings with hamus approaching Sc+R at a sharp angle but not

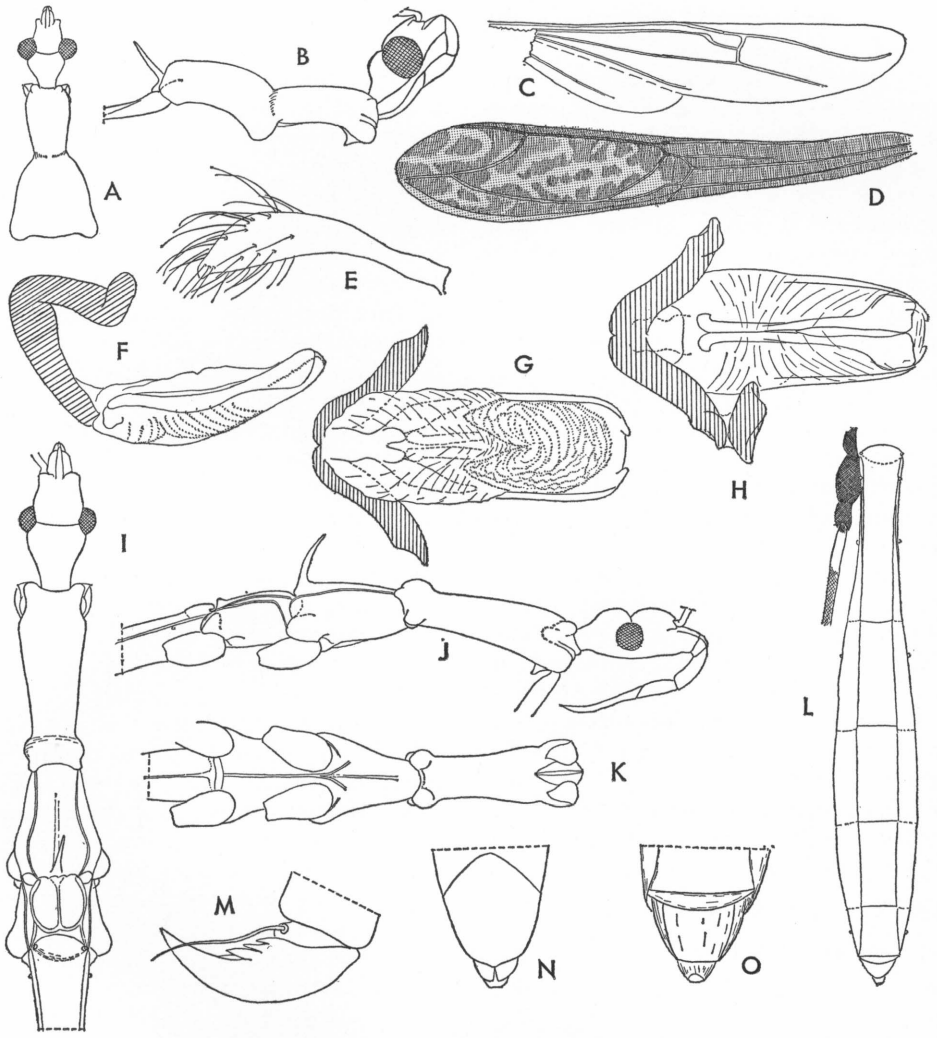


FIG. 66. A–H. *Chinemesa murudiana*, male. A. Head and prothorax, seen from above. B. Anterior portion of body, lateral view. C. Hind wing. D. Forewing, with color pattern. E. Paramere. F. Phallus, lateral view. G. Phallus, ventral aspect. H. Phallus, seen from above. I–O. *Chinemesa feminata*, female. I. Anterior portion of body, dorsal view. J. Anterior portion of body, lateral aspect. K. Thorax, seen from below. L. Abdomen, dorsal view, with base of hind leg showing color pattern. M. Outer claw of foreleg. N. Genital region, ventral aspect. O. Apex of abdomen, seen from behind.

joining same. M-cu cross vein and section of M connecting m-cu to R+M forming an almost straight line. R+M and Cu projecting considerably beyond level of cross vein, simple, not meeting.

Abdomen slender, slightly widened on posterior third; anterior sternites faintly keeled. Last tergite rounded behind, covering most of genital region from above. Eighth sternite narrowly exposed. Pygophore subsemicircular in lateral view; posterosuperior process short and broad, emarginate apically. Phallus symmetrical. Articulatory apparatus large. Phallosoma membranous, in some cases with lateral sclerotizations. Endosoma minutely spiculate.

Apterous female: General characters like those of macropterous male. Eyes small. Pronotum subcylindrical, anterior lobe gradually narrowed posteriorly, posterior lobe distinct but very short, covering only base of mesonotum. Mesonotum about twice as long as wide, slightly convex above and with a faint, median, longitudinal carina, posteriorly with a long, erect spine. Metanotum about as long as wide, much shorter than mesonotum, with a distinct, median, longitudinal carina, lacking process. Abdomen elongate-fusiform, widest shortly behind middle. Genital region not strongly sclerotized.

TYPE SPECIES: *Chinemesa poiana*, new species.

ETYMOLOGY: Named for Dr. W. E. China, the British hemipterist.

DISTRIBUTION: Borneo.

KEY TO THE SPECIES OF *Chimemesa*

1. Females, apterous; general color ferruginous . . . . . *feminata*
   Males, macropterous; general color fuscous . 2
2. Fore lobe of pronotum narrow, three times as long as maximum width (fig. 67A); forewings uniformly brown . . . . . *poiana*
   Fore lobe of pronotum wide, less than twice as long as maximum width (fig. 66B); forewings brownish, their apical halves mottled with yellowish (fig. 66A) . . . *murudiana*

Chinemesa feminata, new species

Figure 66I–O

DESCRIPTION: Apterous female: Total length, 17 mm.; head, 1.75; thorax, 5; abdomen, 10 mm. Body surface highly polished; general color ferruginous. First segment of rostrum piceous, second and third ferruginous. Extreme base and apical third of first antennal segment piceous, extreme apex whitish; remaining segments piceous. Forelegs ferruginous, with luteous annuli distributed as in *murudiana*. Lateral and ventral region of mesothorax and metathorax piceous, as well as coxae and trochantera (fig. 66L) of mid and hind legs. Mid and hind femora ferruginous, with three stramineous annuli: one basal, one submedian, and one apical; light-colored regions very much narrower than darker. Mid and hind tibiae ferruginous on basal half; a basal and a submedian annulus and apical half stramineous. Abdomen ferruginous, slightly and indistinctly mottled with flavous.

Head as shown in figure 66I, J. Eyes small, their dorsal distance equal to three times their width; in lateral aspect not attaining level of dorsal or ventral surface of head. Rostrum as shown in figure 66J. All segments of antennae with only very short pile; length of first segment, 10.5 mm.; relative length of segments, 1/1/0.09/?.

Prothorax as shown in figure 66I, J. Fore lobe of pronotum lacking longitudinal furrow. Ventral surface of thorax as shown in figure 66K.

Forelegs as given in generic description and like those of following species. Coxa longer than pronotum; relative length of other segments as in *poiana*. Posteroventral series of femur composed of about 10 large, and 90 small, spiniferous processes; anteroventral series of about 70 short spines and 18 strong bristles; denticles of ventral surface of tibia numbering about 70. Length of mid femur, 13 mm.; tibia, 18; hind femur, 18; and hind tibia, 25 mm.

Abdomen elongate fusiform, widest on posterior third (fig. 66L). Genital region as shown in figure 66L, N, O.

MATERIAL EXAMINED: Borneo: central Borneo, "Sg. Boh.," 1925, 1300 meters (Mjöberg; Zoologisch Museum), one female holotype; Mt. Tibang, 1925, 1400 meters [Mjöberg; British Museum (Natural History)], one female paratype.

OBSERVATIONS: It is possible that *Chinemesa feminata* represents the female of *Chinemesa murudiana*, described below.

Chinemesa murudiana, new species

Figure 66A–H

DESCRIPTION: Macropterous male: Length of body, 14 mm.

Head and thorax fuscous, somewhat lighter above, especially on clypeus and humeri. Rostrum fuscous, apex of first and base of second article flavescent. First article of antennae luteous, a short annulus at base and a wider one subapically fuscous, extreme apex whitish. Forelegs fuscous; coxa with a wide submedian and a narrow apical annulus luteous; trochanter fuscous; femur with a short basal annulus luteous, and a median, submedian, and subapical annulus whitish; tibia fuscous

on basal half and apical eighth, remainder luteous; first tarsal segment luteous, two apical ones fuscous. Coxae and trochantera of mid and hind legs fuscous. Femora with about 15 alternately dark and light annuli of subequal length, dark ones from castaneous to piceous, light ones luteous to stramineous. Tibia whitish at base, rest ferruginous, with two conspicuous, subbasal, piceous annuli. Forewings fuscous, membrane with veinlike luteous reticulation (fig. 66D), R reddish, remaining veins concolorous. Abdomen fuscous on basal and apical third, lighter-colored toward center, dorsally and ventrally with not very well-delimited reddish stripes. Connexival segments yellowish on anterior half (anterior third on basal segments), piceous on remainder.

Head as shown in figure 66A, B; eyes large, their distance dorsally one and a half times their width; in lateral aspect not attaining upper and slightly surpassing level of lower surface of head, latter with a few long setae. Rostrum as shown in figure 66B. First segment of antennae with numerous long hairs up to 11 times as long as diameter of segment; length of first segment, 10.5 mm.

Prothorax as shown in figure 66A, B; fore lobe slightly shorter than head or hind lobe.

General morphology of forelegs like that of *poiana* (see below), but somewhat stouter. Coxa as long as pronotum; relative length of other segments as in *poiana*. Mid and hind legs moderately elongate; mid femur, 10.5 mm.; tibia, 15.3; hind femur, 14.2 mm. Tarsi and claws like those of *poiana* (see fig. 67J, K).

Forewings attaining tip of abdomen, their venation as shown in figure 66D. Venation of hind wings as shown in figure 66C.

General morphology of abdomen as described for *poiana*. Pygophore like that of *poiana*; parameres very similar, slightly stouter (fig. 66E). Phallus as shown in figure 66F–H; phallosoma lacking 1+1 rod-shaped sclerites in lateral walls.

MATERIAL EXAMINED: Borneo: Sarawak: Mt. Murud [E. Mjöberg; British Museum (Natural History)], one male holotype.

Chinemesa poiana, new species

Figure 67A–R

DESCRIPTION: Macropterous male: Length of body, 16.5 mm.

General color fuscous, head and appendages with a slight reddish tinge. Base of second article of rostrum whitish. Extreme base of first article of rostrum luteous, extreme apex whitish. Forelegs castaneous; femur with four narrow ferruginous annuli: one basal, one submedian, one subapical, and one apical; tibia darker at base and on apical half than on remainder. Coxae and trochantera of mid and hind legs fuscous. Femora fuscous, with about nine ferruginous annuli as wide as intervening darker portions; apical twelfth white. Mid and hind tibiae white at extreme basal third of article ferruginous, with faint lighter annuli, apical two-thirds gradually becoming stramineous; tibiae of second pair of legs with a short, subapical, piceous annulus. Tarsi stramineous. Forewings uniformly fuscous. Abdomen castaneous.

Head as shown in figure 67A, B, D. Eyes relatively small, their distance dorsally twice their width; in lateral view remote from level of upper and almost attaining level of under surface of head. Lower surface of head with a few long hairs in addition to short pile. Rostrum as shown in figure 67D. First segment of antennae with numerous long hairs about five times as long as diameter of segment. Length of first segment, 13 mm.; relative length of segments, 1/1/0.09/?.

Prothorax as shown in figure 67A, B, D; fore lobe of pronotum longer than head or hind lobe, with an indistinct, median, longitudinal impression; hind lobe strongly widened, humeri slightly elevated, hind border strongly deflexed; disc rather convex, polished, along center with a strongly wrinkled furrow widened posteriorly. Prothorax on all surfaces with several long, slender hairs. Spine of scutellum as shown in figure 67D, erect. Metanotum pointed apically, with a median longitudinal carina. Ventral surface of thorax as shown in figure 67A.

Forelegs as given in generic description and shown in figure 67D–F, H, I, L, very slender. Fore coxa as long as pronotum. Fore femur almost twice as long as coxa, slender, parallel-sided. Posteroventral series composed of about 12 large and 105 small spiniferous processes, first large process not quite so long as some of remainder, its distance from base of femur corresponding to one-seventh of length of latter. Anteroventral series beginning at

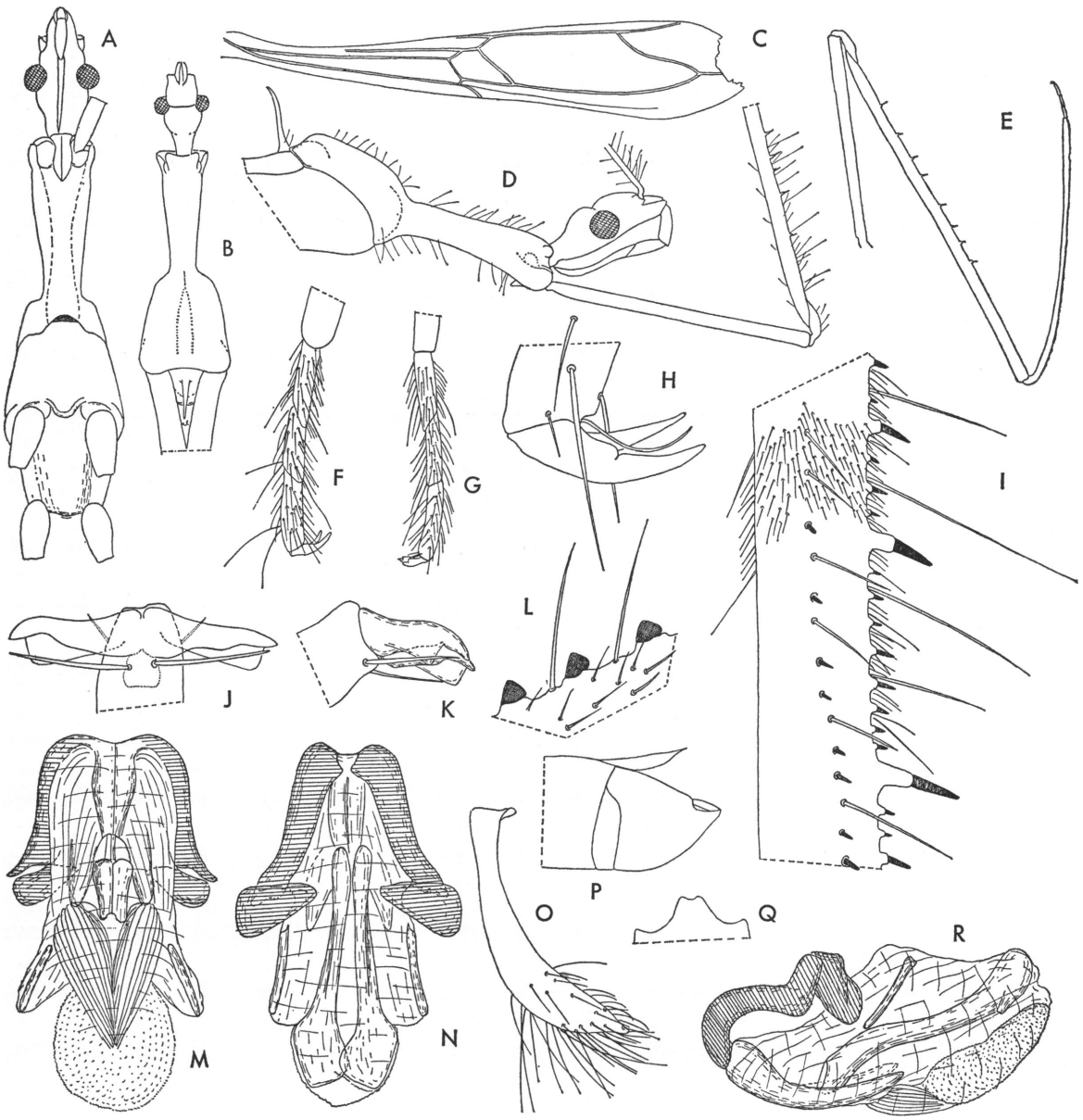


FIG. 67. *Chinemesa poiana*, male. A. Head and thorax, seen from below. B. Anterior portion of body, dorsal view. C. Forewing. D. Anterior portion of body, lateral aspect. E. Foreleg. F. Fore tarsus. G. Posterior tarsus. H. Praetarsus and claws of foreleg. I. Base of series of fore femur. J. Praetarsus and claws of hind leg, seen from below. K. Praetarsus and claws of hind leg, lateral aspect. L. Detail of under surface of fore tibia. M. Phallus, ventral aspect. N. Phallus, dorsal view. O. Paramere. P. Apex of abdomen, lateral aspect. Q. Process of pygophore. R. Phallus, lateral view.

about one-third from base of femur, composed of about 70 short spines and 24 strong bristles. Tibia two-thirds as long as femur, very slender, slightly curved, spines of ventral surface numbering about 100. Tarsus and claws as given in generic description and shown in figure 67F, H. Mid and hind legs very slender and elongate; mid femur, 14 mm.; tibia, 21; hind femur, 20; and hind tibia, 27 mm. Tarsi and claws as given in generic de-

scription and shown in figure 67G, J, K.

Forewings attaining tip of abdomen, their shape and venation as shown in figure 67C.

Abdomen slender, faintly widened toward posterior third, with a few slender, long hairs on ventral surface in addition to short pile. Tergites simple; sternites faintly but distinctly keeled. Last tergite tongue-shaped, wrinkled transversely, covering basal two-thirds of pygophore; latter simple in outline (fig. 67P), its posterosuperior border with a short, apically slightly emarginated projection (fig. 67Q). Parameres short, slightly curved, widened on apical third, acuminate apically, their distal third with numerous long bristles (fig. 67 O). Phallus as shown in figure 67M, N, R, characterized by 1+1 lateral, free, rodlike sclerites on phallosoma wall.

MATERIAL EXAMINED: Borneo: Mt. Poi [British Museum (Natural History)], one male holotype.

DOHRNEMESA WYGODZINSKY

Dohrnemesa WYGODZINSKY, 1945c, p. 251.

DESCRIPTION: Macropterous. Medium-sized species (10–16 mm.), conspicuously marked.

Body slender, with delicate appendages. Body surface from dull to slightly shining, pronotum often conspicuously wrinkled. Body and legs with short pubescence, and with more or less numerous interspersed, slender hairs.

Head rather short, anteocular slightly shorter than postocular region, latter rather convex above, its sides converging posteriorly, constricted about middle in dorsal view; neck distinct, slender. Interocular furrow situated slightly posterior to level of center of eyes, almost straight across. Rostrum distinctly bent between first and second segments, both stout, second in some cases slightly swollen; first and second subequal in length, second attaining level of center of eyes; third somewhat longer than second. Antennae inserted nearer to apex of head than to anterior border of eyes.

Pronotum completely covering mesonotum, pedunculate; fore lobe semiglobular to semi-oval; petiole distinctly separated from fore and hind lobe of pronotum or not; hind lobe bell-shaped, lacking discal and without or rarely with humeral projections. Scutellum with a long spine; metanotum with a medium-sized to short but invariably distinct spine.

Forelegs from stout to slender. Posteroventral series of fore femur beginning at base of article, composed of large and small spiniferous processes bearing medium-sized apical spines; large processes of subequal size, basal one either straight or slightly inclined toward apex of article. Anteroventral series beginning somewhat apicad of posteroventral, not interrupted at base, composed of medium-sized and small, generally rather slender spines, inserted on short bases, accompanied often by spinelike setae. Tibia hardly shorter than femur, slender, straight or slightly curved, ventrally with one series of small, slender, or conical spines of two sizes. Fore tarsus very short, at most one-eighth as long as tibia, three-segmented, segments subequal in size, weakly chitinized, hairy on all surfaces. Claws subequal in size, outer one with about five small, submedian projections, inner one with medially incised ventral lamella, and with three larger processes basad of incision. Mid and hind legs medium-sized to long, hind femur surpassing apex of abdomen; femora with microchaetae and scattered longer delicate hairs. Tarsi of mid and hind legs slender, three segments subequal in size. Claws strongly curved, with a well-developed, medially incised, ventral lamella.

Forewings broad to slender, not emarginated apically, with discal and basal cell. Pcu meeting basal cell near or beyond apex of cell. Two basally directed veins emitted from basal cell; Cu attaining axillary region, M short, free. Pterostigma falling considerably short of apex of wing. Hind wing with hamus approaching Sc+R only gradually, not fused to same. R+M and Cu extending beyond level of cross vein to wing margin, simple, free. Anal lobe distinctly sclerotized between 2A and hind margin.

Abdomen from narrow to conspicuously widened at middle, connexival borders continuous or more or less lobate.

Male: Last tergite subsemicircular, not longer than wide. Pygophore subsemicircular in lateral view. Posterior process from weakly developed, rounded apically, to distinct, spinelike. Parameres simple in structure, rodlike, curved toward apex, with short and long

setae. Phallus symmetrical. Basal plates fused, separated only near insertion of phallotheca. Basal plate struts short, fused with exception of extreme base, widened toward apex, where they may be emarginated or incised. Phallobase membranous, with a distinct sclerotization dorsally at apex, this sclerotization in some cases fused to apex of struts; ventral sclerotization of phallobase in shape of two slender rods, which are in some cases fused apically and may be continued into (partially everted) endosoma with 1+1 apparently articulated extensions. Endosoma membranous, simple or with more or less developed bladder-like expansions.

Female: Genitalia simple, eighth and ninth tergites weakly sclerotized.

TYPE SPECIES: *Dohrnemesa lanei* Wygodzinsky (by original designation).

DISTRIBUTION: Neotropical Region.

OBSERVATIONS: This genus contains a moderate number of species, both described and undescribed, of rather varied general aspect, which can be roughly divided into two groups. The first group, in which are the type species (*lanei*) and others, such as *albuquerquei*, includes very slender species with elongate pronotum (figs. 68B; 70B) and rather simple male genitalia (fig. 70Q, T, U). The second group, in which are *difficilis*, *exporrecta*, and *carvalhoi*, has a much shorter pronotum (fig. 69A, B), with the petiole conspicuously detached from the fore and hind lobe, a strongly widened abdomen with flaring connexival segments (fig. 69A), and, at least in the only male examined, a somewhat more complex phallus (fig. 69M, N).

It has not been decided if the dissimilarities mentioned should be considered as indicating generic differences. An examination of males of additional species of the *difficilis* group may assist in the clearing up of this question.

KEY TO THE SPECIES OF *Dohrnemesa*

1. Fore lobe of pronotum subglobular, abruptly narrowed behind and distinctly separated from petiole (fig. 69A, H); abdomen clavate, connexival segments strongly lobate (fig. 69A, K) (*difficilis* group) 6
   Fore lobe of pronotum not subglobular, more elongated, not abruptly constricted behind, not distinctly separated from petiole (figs. 68A, B; 70B); abdomen slender, elongate, only faintly widened posteriorly, its outline either continuous or borders faintly lobate only (fig. 70A) (*lanei* group) 2
2. Fore femur piceous, only apex white (fig. 68B); pcu cross vein of forewing situated at level of limit between basal and discal cell (fig. 68A) . . . . . *albuquerquei*
   Fore femur with more than one light-colored annulus (fig. 70J); position of pcu cross vein different (fig. 70C, D) 3
3. Forewings rather uniformly dark brown, with a diagonal white stripe at junction of cells (fig. 70A), apex almost uniformly dark . . 4
   Forewings with rather varied light-colored pattern elements, apex extensively white (pl. 2, fig. 3) 5
4. Apex of fore femur broadly white (fig. 70J); first rostral segment mainly whitish (fig. 70B) . . . . . *reimoseri*
   Apex of fore femur broadly dark; first rostral segment mainly dark . . . . *buyassuana*
5. Pcu cross vein inserted basad of level of apex of discal cell, latter strongly elongate apically at inner margin (fig. 70C); postocular portion of head dorsally at center behind constriction with a small but distinct tubercle; petiole of pronotum distinctly longer than fore lobe of same; larger spiniferous processes of posteroventral series of fore femur combined with their spines about as long as diameter of femur . . . . . *lanei*
   Pcu cross vein inserted apicad of level of apex of discal cell, latter less elongate apically at inner margin (fig. 70D); postocular portion of head lacking tubercle; petiole of pronotum not distinctly longer than fore lobe; larger spiniferous processes of posteroventral series of fore femur combined with their spines distinctly shorter than diameter of segment . . . . . *santosi*
6. Fore lobe and petiole of pronotum mainly whitish (fig. 69A) 7
   Fore lobe and petiole of pronotum mainly brown . . . . . *difficilis*
7. Petiole of pronotum very short, petiole plus fore lobe as long as hind lobe (fig. 69A); large spiniferous processes of fore femora dark brown, combined with their spines much longer than diameter of segment (fig. 69D); spines of under surface of fore tibia short, conical (fig. 69F) . . . . . *carvalhoi*
   Petiole of pronotum longer, petiole plus fore lobe much longer than hind lobe (fig. 69H); large spiniferous processes of fore femur white, together with their spines not longer than diameter of segment (fig. 69J); spines of under surface of tibia slender (fig. 69I) . . . . . *exporrecta*

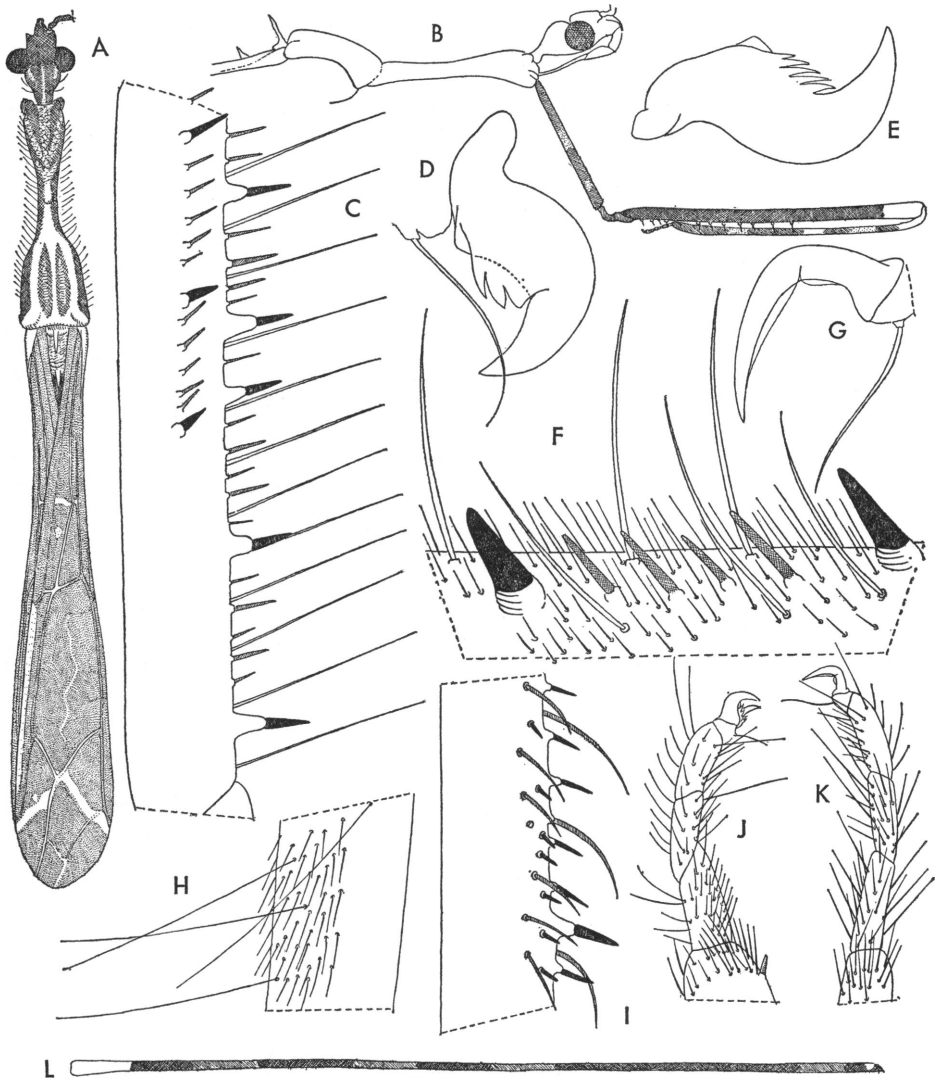


FIG. 68. A–F. *Dohrnemesa albuquerquei*, male. A. General aspect, with color pattern. B. Anterior portion of body, lateral aspect, color pattern shown on fore femur only. C. Base of fore femur. D. Inner claw of foreleg. E. Outer claw of foreleg. F. Detail of under surface of fore tibia. G, H. *Dohrnemesa lanei*. G. Claw of hind leg. H. Portion of posterior femur, setae shown on only half of area. I. *Dohrnemesa santosi*, portion of fore femur. J, K. *Dohrnemesa lanei*. J. Apex of fore tibia, with tarsus. K. Hind tarsus. L. *Dohrnemesa albuquerquei*, posterior femur, color pattern.

Dohrnemesa albuquerquei, new species

Figures 68A–F, L; 70E–G, K, P–R, T, U

DESCRIPTION: Male: Length to apex of forewing, 13.5 mm.; of head and pronotum, 5 mm.; of forewing, 8.5 mm.

General color of head and thorax piceous. Postocular portion of head with a median longitudinal line and 1+1 short streaks behind eyes, yellowish.

Pronotum narrowly stramineous above on center of fore lobe and petiole; disc of hind lobe broadly stramineous, with 1+1 submedian, longitudinal vittae ochraceous, bordered with fuscous. Scutellum and metanotum ochraceous, their spines stramineous.

Forewings castaneous. Costal margin of wing base, Cu from level of free base of M to slightly beyond level of pcu cross vein, as well as the latter itself, veins enclosing apex of discal cell and portion of M emitted from tip of cell, two spots on area between Cu and M at level of basal cell, and two oblique stripes near tip of wing forming a continuation of veins enclosing apex of discal cell, whitish, last-mentioned with a faint, irregular, percurrent line along its center. Hind wings smoky brown. Antennae piceous, first segment with four and second with three very narrow, widely spaced, yellowish annuli. Rostrum piceous, extreme apical margin of first and apical third of second segment, yellowish. Forelegs piceous; coxa with one distinct, submedian annulus, yellowish; femur with one broad apical annulus, white; tibia with one basal, one subbasal, and one submedian annulus, whitish. Coxae of mid and hind legs piceous; trochantera white, with apex piceous; femora (fig. 68L) piceous, with five wide, ochraceous annuli; apex broadly white; tibiae broadly white at base, rest ochraceous to stramineous, with three broad, piceous annuli on basal half. Abdomen castaneous below, marbled with flavous; connexival segments with alternate piceous and whitish portions. Pygophore piceous, its apex and parameres whitish.

Body surface with short adpressed pile; longer erect hairs in moderate number on head, thorax (especially on fore lobe of pronotum), and abdomen ventrally.

Shape of head and rostrum as shown in figure 68A, B. Postocular portion dorsally with a faint tubercle in center behind interocular furrow. Distance between eyes dorsally equal to their width; circular in lateral view, attaining level of ventral, but not of dorsal, surface of head. Antennae with short hairs only. Length of first segment, 7 mm.; relative length of segments, 1/0.95/0.11/0.22.

Shape of pronotum as shown in figure 68A, B. Fore lobe elongate oval. Petiole not distinctly detached from fore lobe, separated from hind lobe by a faint impression; a very slight elevation somewhat anterior to its center dorsally. Hind lobe bell-shaped, longer than wide across humeri, latter rounded; disc of pronotum elevated, with a faint, median, longitudinal depression. Spine of scutellum elongate, slender (fig. 68B), that of metanotum half as long. Fore lobe and petiole subshining, microscopically reticulate; hind lobe dull, very faintly wrinkled.

Forelegs very slender (fig. 68B), femur about 20 times as long as width at middle. Posteroventral series (fig. 68C) composed of about 10 larger and 45 smaller spiniferous tubercles, beset with medium-sized spines, those of larger tubercles heavily chitinized, slightly longer than tubercles, combined with latter shorter than diameter of segment; smaller ones very slender, less strongly chitinized, their bases reduced to small warts. Anteroventral series (fig. 68C) composed of about nine medium-sized, and 50 small, spiniferous tubercles similar to those of posteroventral series, shorter spines almost bristle-like. Posteroventral series accompanied by long, slender, strongly sclerotized setae. Tibiae ventrally with about 13 heavily chitinized larger, and very numerous shorter, less-pigmented slender spines (fig. 68F). Tarsus and claws as given in generic description and shown in figure 68D, E. Mid and hind legs slender, posterior femur surpassing apex of forewings by 5.5 mm. Femur with microchaetae and isolated larger hairs (fig. 68H), their length not surpassing that of diameter of segment.

Forewings surpassing apex of abdomen by 0.5 mm., their venation as shown in figure 68A. Pcu cross vein emitted from limit between basal and discal cell. Venation of hind wing as shown in figure 70E.

Abdomen slender at base, somewhat widened toward posterior fourth, connexival margins entire, continuous. Structure of genital region as shown in figure 70F, G, K, P. Hind border of eighth sternite continuous. Upper margin of pygophore broadly triangular. Shape and chaetotaxy of parameres as shown in figure 70R; their apex rounded, more strongly sclerotized. Phallus as shown in figure 70Q, T, U, struts apparently fused apically with dorsal sclerotization of phallotheca wall. Structure of endosoma apparently very simple.

MATERIAL EXAMINED: Brazil: Estado do Rio, Alto da Mosela, Petropolis, November, 1956 (Albuquerque; Museu Nacional), one male holotype.

OBSERVATIONS: This species, named for its

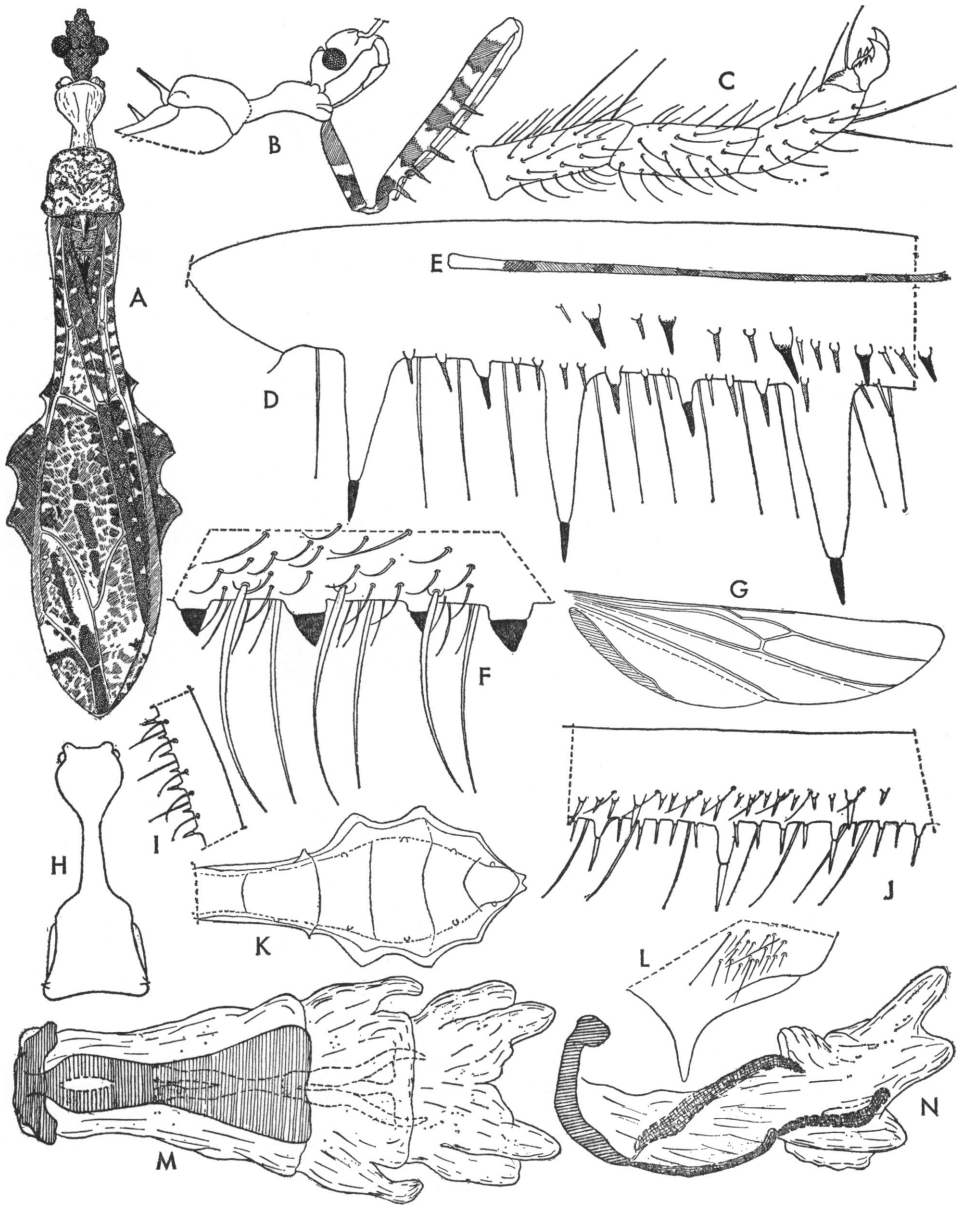


FIG. 69. A–G. *Dohrnemesa carvalhoi*, female. A. General aspect, with color pattern. B. Anterior portion of body, lateral view, color pattern shown on leg only. C. Fore tarsus. D. Base of fore femur. E. Mid femur, color pattern. F. Detail of under surface of fore tibia. G. Hind wing. H–J. *Dohrnemesa exporrecta*. H. Pronotum. I. Portion of fore tibia. J. Part of basal portion of fore femur. K. *Dohrnemesa carvalhoi*, female, abdomen, seen from below. L–N. *Dohrnemesa exporrecta*, male. L. Apex of pygophore. M. Phallus, dorsal view. N. Phallus, lateral aspect.

collector, Dr. Dalcy de Oliveira Albuquerque, is easy to recognize by such characters as the very extensive dark coloring of the fore femora, the pattern of the pronotum and forewings, the chaetotaxy of the fore femur and tibia, and the position of the Pcu cross vein on the forewings.

Dohrnemesa buyassuana Wygodzinsky

Figure 70L–O, S, V

Dohrnemesa buyassuana WYGODZINSKY, 1958b, p. 335, figs. 21–30.

This species has been known only from the female. A male presently at hand agrees very well with the female in structural and color characters. Its genital region (fig. 70M–O) is mainly characterized by the irregularly shaped hind border of the eighth sternite and the slender, pointed, apical process of the pygophore. The paramere is shown in figure 70L and the phallus in figure 70S, V; the struts are shorter and wider than in *albuquerquei* and apparently not fused with the differently shaped sclerotization of the dorsal wall of the phallotheca.

MATERIAL EXAMINED: Brazil: Amazonas: Yguapé do Turumanzinho, Manaus, January 9, 1956 (Elias and Rappa, no. 1308; Museu Nacional), one male allotype.

DISTRIBUTION: Northern Brazil.

TYPE: Female, British Museum (Natural History).

Dohrnemesa carvalhoi, new species

Figure 69A–G, K

DESCRIPTION: Female: Length to apex of forewings, 11.5 mm.; head and pronotum, 3.5; forewings, 8 mm.

Head and rostrum piceous. Antennae whitish; first segment with one narrow subbasal annulus, and one subapical as well as three wide submedian annuli, castaneous; second segment with one narrow basal and one subapical, one slightly wider subbasal, and one wide submedian, annulus castaneous. Fore lobe of pronotum and petiole ivory-colored, anterior region of prothorax below and whole ventral portion piceous. Hind lobe of pronotum testaceous, variegated with castaneous. Scutellum and metanotum castaneous to piceous, spines ivory-colored. Mesopleura and metapleura piceous, clouded with castaneous. Forewings whitish, spotted with castaneous as shown in figure 69A. Forelegs ivory-colored; coxae ferruginous on basal, piceous on apical, third, a spot in piceous portion and extreme apex narrowly white, large spiniferous processes dark; trochanter piceous on apical two-thirds; femur on outer surface with five, on inner surface with four, dark annuli, basal one piceous, remainder ferruginous bordered with castaneous; tibia with two narrow, submedian annuli castaneous, apical half of article ferruginous; third tarsal segment piceous. Coxae of mid and hind legs piceous, rest of legs ivory-colored; femora with about five equidistant, brown annuli, apex broadly whitish (fig. 69E); base of tibiae broadly white, a subbasal narrow and a submedian wider annulus brown, apical half of article brownish.

Body and legs with dense, silklike, adpressed pubescence, rather sparse on posterior lobe of pronotum; under surface of head, thorax, and abdomen, as well as forelegs, with moderately numerous erect long setae. Head, fore lobe and petiole of pronotum, and mesothorax and metathorax subshining; hind lobe of pronotum and abdomen dull. Fore lobe of pronotum and petiole microscopially reticulate; hind lobe of pronotum coarsely and irregularly rugose.

Shape of head and rostrum as shown in figure 69A, B. Postocular portion dorsally at center behind transverse sulcus with a distinct small elevation. Distance between eyes dorsally slightly larger than width of eyes, latter subcircular in lateral view, not attaining level of dorsal or ventral surface of head. Antennae bare; length of first segment, 6.2 mm.; relative length of segments, 0/0.7/-0.24/?.

Pronotum as shown in figure 69A, B. Fore lobe subglobular in dorsal view; petiole shorter than fore, and distinctly detached from hind, lobe, latter slightly shorter than wide across humeri, its sides distinctly diverging posteriorly; disc convex, very faintly depressed longitudinally along middle, humeri elevated but not tuberculate or spined; anterior portion of lateral surface of hind lobe of pronotum with 1+1 incomplete carinae. Spine of scutellum long and slender, that of metanotum only half as long (fig. 69B).

Forelegs as shown in figure 69B–D, F,

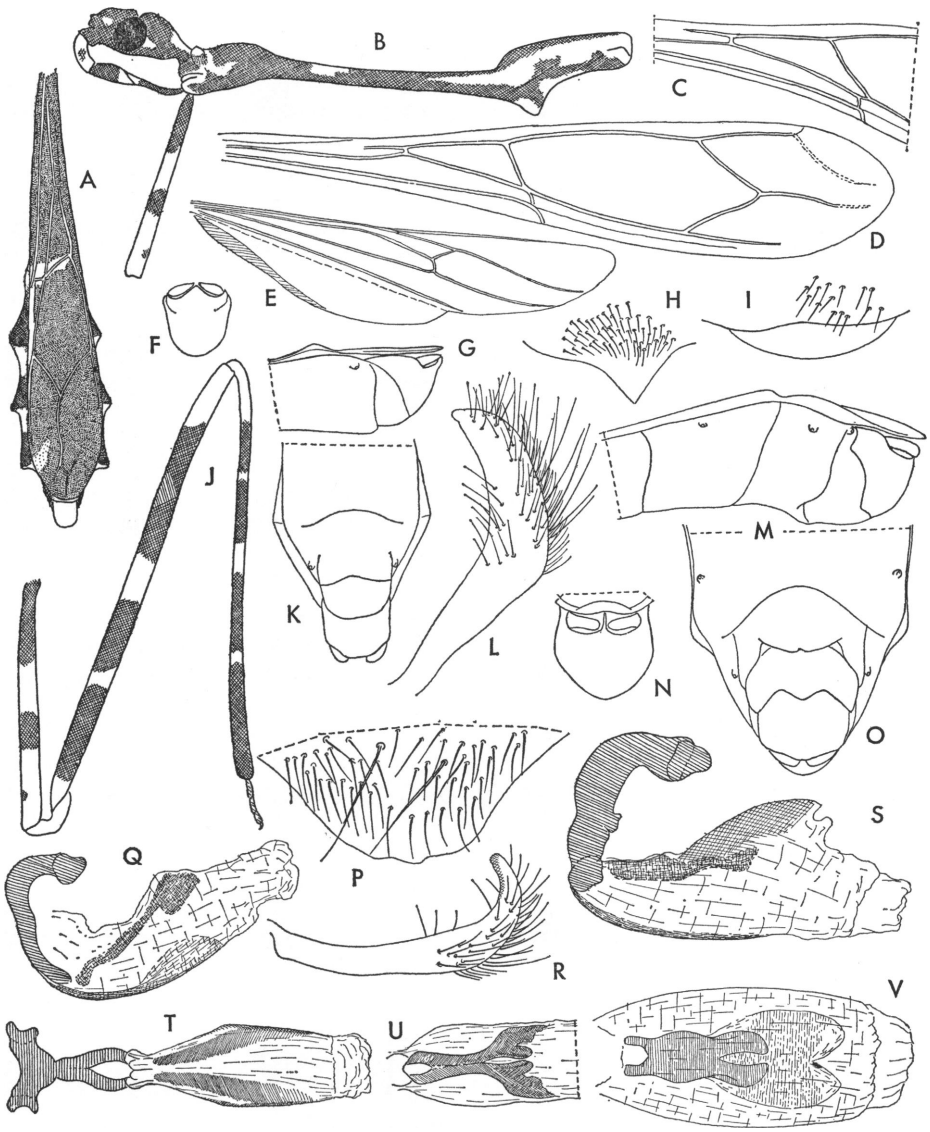


FIG. 70. A, B. *Dohrnemesa reimoseri*, female. A. Abdomen and wings, seen from above, with color pattern. B. Anterior portion of body, lateral view, with color pattern. C. *Dohrnemesa lanei*, detail of forewing. D. *Dohrnemesa santosi*, forewing. E–G. *Dohrnemesa albuquerquei*. E. Hind wing. F. Pygophore, seen from behind. G. Apex of abdomen, lateral view. H. *Dohrnemesa lanei*, apex of pygophore. I. *Dohrnemesa santosi*, apex of pygophore. J. *Dohrnemesa reimoseri*, foreleg, with color pattern; spines not shown. K. *Dohrnemesa albuquerquei*, male, apex of abdomen, ventral view. L–O. *Dohrnemesa buyassuana*, male. L. Paramere. M. Apex of abdomen, lateral view. N. Pygophore, seen from behind. O. Apex of abdomen, ventral aspect. P–R. *Dohrnemesa albuquerquei*. P. Process of pygophore, high magnification. Q. Phallus, lateral view. R. Paramere. S. *Dohrnemesa buyassuana*, phallus, lateral view. T, U. *Dohrnemesa albuquerquei*. T. Phallus, ventral aspect, U. Basal half of phallosoma, seen from above. V. *Dohrnemesa buyassuana*, phallosoma, seen from above.

stout, femur not more than 15 times as long as wide at middle. Posteroventral series composed of five extremely large, spiniferous processes, combined with their relatively short apical spines one and a half times as long as diameter of segment; posteroventral series furthermore with approximately 20 medium-sized and small spines inserted on short bases, accompanied by numerous long and strong setae, small spines inserted mesad of large processes and not extended beyond level of large processes. Anteroventral series beginning at level of second large process of posteroventral series, attaining apex of article, composed of about 45 medium-sized and small spines similar to those of posteroventral series. Tibia slightly curved, slender, ventrally with about 50 short, conical denticles of two sizes (fig. 69F). Tarsus as shown in figure 69C; claws as described and figured above for *albuquerquei*, new species (see fig. 68D, E). Mid and hind legs slender, femur lacking distinct long hairs in addition to microchaetae, hind femora surpassing apex of forewings by 4 mm.

Forewings surpassing apex of abdomen by 2 mm.; their shape and venation as shown in figure 69A; Pcu cross vein inserted on basal cell before apex of latter. Hind wings as shown in figure 69G.

Shape of abdomen as shown in figure 69A, K, widest on fourth segment, connexival margins of third to seventh segment triangularly lobate, most conspicuously so on third and fourth segments.

MATERIAL EXAMINED: Brazil: Guanabara: Corcovado, Rio de Janeiro, 1959 (José Cândido de Melo Carvalho; Museu Nacional), one female holotype.

OBSERVATIONS: This new species, named for its collector, differs from all known species of the genus by the extremely elongate spiniferous processes of the fore femur, in addition to other less conspicuous characters.

Dohrnemesa difficilis (Dohrn)

Westermannia difficilis DOHRN, 1860, p. 251.

The rather detailed description of the color pattern of this species given by Dohrn (1863) makes it obvious that the species figured as *Westermannia difficilis* by Champion (1898a) from Panama is not the same, though it belongs to the *difficilis* group.

DISTRIBUTION: Colombia.

TYPE: Zoologisches Museum der Universität, Berlin.

Dohrnemesa exporrecta Wygodzinsky

Figure 69H–J, L–N

Dohrnemesa exporrecta WYGODZINSKY, 1958b, p. 337, figs. 31–43.

For comparative purposes, some characters of this species are illustrated here.

DISTRIBUTION: West Indies: St. Vincent.

TYPE: Male, British Museum (Natural History).

Dohrnemesa lanei Wygodzinsky

Figures 4I; 68G, H, J, K; 70C, H

Dohrnemesa lanei WYGODZINSKY, 1945c, p. 252, figs. 19, 21–33.

For comparative purposes, a few structures of this species are illustrated.

DISTRIBUTION: Brazil (São Paulo).

TYPE: Male, Departamento de Zoologia.

Dohrnemesa reimoseri (Wygodzinsky) new combination

Figure 70A, B, J

Polauchenia reimoseri WYGODZINSKY, 1950b, p. 79, figs. 23–30.

The possession of two veins emitted from the base of the basal discal cell shows that this species belongs to *Dohrnemesa*. It is very close to *buyassuana*, from which it can be distinguished only by color characters, at least in the female sex.

DISTRIBUTION: Costa Rica.

TYPE: Female, Naturhistorisches Museum, Vienna.

Dohrnemesa santosi Wygodzinsky

Plate 2, figure 3; text figures 68I; 70D, I

Dohrnemesa santosi WYGODZINSKY, 1945c, p. 255, figs. 20, 34–45.

A few structures of this species are illustrated.

DISTRIBUTION: Brazil (São Paulo).

TYPE: Male, Museu Nacional.

In addition to the above-mentioned, I have before me two additional undescribed species of the *lanei* group from the province of Santiago del Estero, Argentina, and from the yungas of Bolivia, respectively.

EMESA FABRICIUS

Emesa FABRICIUS, 1803, p. 263.

Westermannia DOHRN, 1860, p. 251 (preoccupied by *Westermannia* Hübner, 1866).

Westermannias KIRKALDY, 1904, p. 280.

Emesa (*Emesa*): MCATEE AND MALLOCH, 1925, p. 40.

DESCRIPTION: Macropterous. Medium-sized to large species (13–28 mm.).

Body surface dull to subshining, covered with moderately dense, very short pile and isolated, inconspicuous, longer hairs. Pattern elements conspicuous, whitish and brown, antennae and legs annulated.

Anteocular region of head somewhat longer than postocular, latter strongly constricted shortly behind eyes, very slender posteriorly. Eyes large. Interocular furrow situated at level of center of eyes. Rostrum strongly bent between first and second segments, both of subequal length, second slightly swollen on basal third; third segment longer than either first or second. Antennae inserted about midway between eyes and anterior border of head.

Pronotum completely covering mesonotum. Anterior lobe subglobular to oval; pedunculate portion long and slender, much longer than fore lobe; hind lobe approximately bell-shaped, disc in some cases with 1+1 small elevations posteriorly, humeri with or without tubercles or spines. Scutellum and metanotum lacking processes or spines.

Forelegs long and slender. Coxae and trochantera simple. Femora with two series of short spines of two conspicuously different sizes, inserted on large processes; large basal process of posteroventral series not inclined toward base of segment. Anteroventral series not interrupted near base. Fore tibia about two-thirds as long as femur, on ventral surface with one series of short denticles of two different sizes inserted on distinct tubercles, and two rows of strong setae. Fore tarsus one-eighth as long as tibia, three-segmented, hairy on all surfaces; first segment as long as, or slightly longer than, either second or third. Claws subequal in size, outer one with three to four slender, laminar processes on basal half of its ventral surface, inner one with a medially incised ventral lamella. Mid and hind legs elongate, femora considerably surpassing apex of abdomen, with short setae only, lacking macrochaetae. First segment of mid and hind tarsi slightly longer than second or third; claws each with a large, spiniform, perpendicular process ventrally near base.

Forewings slender, not emarginated apically, with discal, basal, and subbasal cells. Pterostigma falling distinctly short of wing tip. Discal cell large, basal cell either strongly reduced or small, subtransverse, accompanying basal margin of discal cell, or large, elongate, separating subbasal cell by a large extension from discal cell. A single basally directed vein emitted from base of subbasal cell. Hind wing with hamus approaching Sc+R very closely, in some cases almost completely fused to same. M-cu cross vein very elongate, obliquely inclined toward base of wing. Section of M connecting m-cu to R+M extremely short. R+M and Cu extending from level of cross vein to border of wing, in some cases meeting and forming a large cell.

Abdomen elongate, somewhat flaring behind, posterior angles of seventh segment pointed and salient in both sexes.

Male: Last tergite elongate, tongue-shaped, not completely covering genitalia from above. Eighth sternite large, annular. Outline of pygophore subsemicircular in lateral view, rather small in relation to total length of abdomen. Posterior process of pygophore spinelike, somewhat compressed anteroposteriorly. Parameres simple, slightly curved, with simple setae. Phallus symmetrical. Basal plates strongly divergent, connected near insertion of phallobase only. Phallosoma membranous, with 1+1 lateral, membranous projections; phallotheca wall with ventral and lateroventral, but lacking dorsal, sclerotized areas. Struts directed toward dorsal surface of phallosoma, almost completely fused, resulting sclerite narrowly constricted about middle, conspicuously widened apically. Endosoma lacking sclerotized projections.

Female: Genitalia directed slightly downward, weakly sclerotized. Gonocoxites transverse, with microchaetae and macrochaetae. Syngonapophysis slightly pointed at middle behind, setae arranged in longitudinal rows.

TYPE SPECIES: Of *Emesa*, *Gerris mantis* Fabricius, as *Emesa mantis* (by subsequent

designation, Laporte, 1832); of *Westermannia*, *Westermannia annulata* Dohrn (by subsequent designation, McAtee and Malloch, 1925).

DISTRIBUTION: Neotropical Region.

Five species of *Emesa* (one not yet described) occur, with rather restricted ranges, in Central America and the West Indies; a sixth is widely dispersed over the South American continent.

OBSERVATIONS: McAtee and Malloch (1925) considered *Emesa* to be masculine in gender. I prefer to follow Brown (1956) and use the feminine gender. The same criterion is applied to all other generic names ending in *-emesa*.

McAtee and Malloch (1925) have given ample information on the history of *Emesa*, which can be summarized and supplemented as follows:

In 1803 Fabricius described *Emesa* as a new genus and included in it three species that had been named earlier (*filum*, *longipes*, and *mantis*), as well as one new species (*precatorius*). Fabricius is not to be considered as having designated a type species (Opinion 81 of the International Commission of Zoological Nomenclature). Laporte (1832, p. 84) gave a short description of *Emesa* Fabricius and mentioned the fact that the genus was composed of few species. This statement is followed, in conspicuous type, by "Emesa mantis Fab. Syst. rh. 263, n° 3." The names of some species in other genera were printed in conspicuous type, for instance, *Belostoma rustica* Fabricius in the genus *Diplonychus*. In this particular case, there is a reference on page 83, in the "Supplément," as follows: "C'est par erreur que j'ai indiqué (pag. 18) le *Belostoma rustica* de Fabricius, *comme le type* [italics mine] du genre *Diplonychus*." This statement is followed by synonymical considerations. It is obvious that Laporte indicated a type species by special typography, having clearly implied this method in at least one case that is entirely comparable with the case of *Emesa*. Van Duzee (1916, 1917) also considered that Laporte (1832) gave *mantis* as the type of *Emesa*, but rejected this designation as unnecessary as he considered that Fabricius himself had designated *precatorius* as the type of *Emesa*, but Fabricius' type designations are not now accepted. Van Duzee (1916, 1917) again fixed *precatorius* as the type of *Emesa*. McAtee and Malloch (1925) also accepted Laporte (1832) as having designated *mantis* as the type species of *Emesa* by having given it as sole example of the genus. They consequently created the new genus *Emesaya* for the reception of *precatorius* and its allies, which are not congeneric with *mantis*.

It can now be shown that, even if Laporte's type designation were not accepted, Van Duzee's type fixation still would not be the first valid one. Brullé (1836) unequivocally named *Emesa filum* Fabricius as the type of *Emesa*. This is a species that Dohrn (1860), Stål (1869), and McAtee and Malloch (1925) were unable to place and the type of which is not extant. The last-named authors come to the conclusion "that the species is entirely unidentifiable." Thus, if Brullé's type fixation were to be considered as the first valid one (which would be the case if Laporte were not credited as having designated a type) the type genus of the subfamily Emesinae would be based on an unidentified species and thus be unidentifiable itself—certainly an awkward situation.

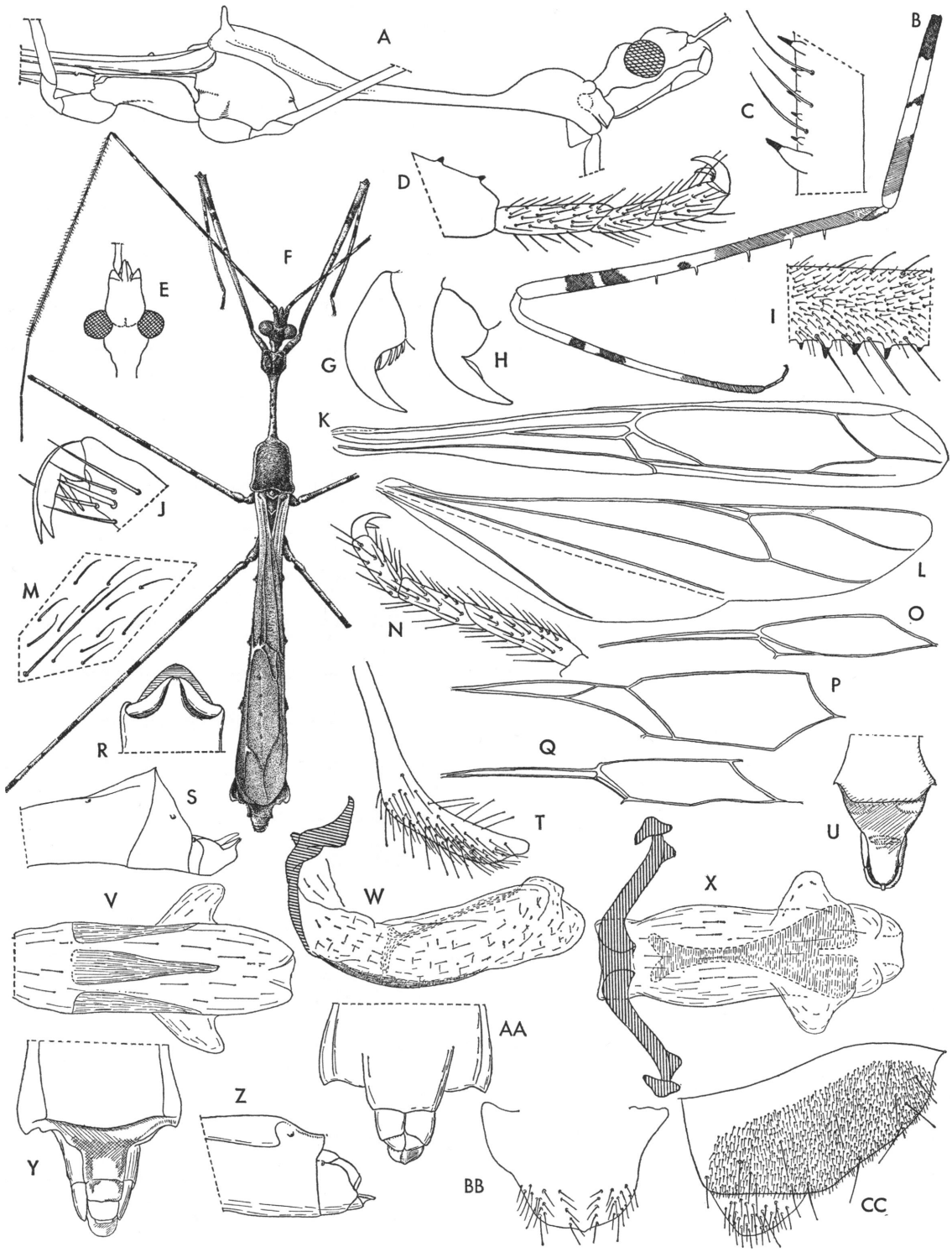
KEY TO THE SPECIES OF *Emesa*

1. Basal cell large, distinctly longer than wide, interpolated between subbasal and posterior discal cell (fig. 71P) . . . . . *annulata*
   Basal cell small, much wider than long, subbasal cell abutting at base of discal cell (fig. 71K, O, Q) 2
2. Humeri spined (fig. 71A) 3
   Humeri not spined (fig. 71F) 4
3. Intermediate discal cell almost obsolete (fig. 71Q) . . . . . *tenerrima*
   Intermediate discal cell larger (fig. 71 O) . . . . . *marmorata*
4. Anterior lobe of pronotum with a sharply pointed tubercle on each side anteriorly; mid and hind femora virtually uniformly light-colored between dark annuli . *mantis*
   Anterior lobe of pronotum with a rounded tubercle on each side anteriorly (fig. 71F); femora with numerous small dark spots on light-colored spaces between dark annuli (fig. 71F) . . . . . *mourei*

Emesa annulata (Dohrn)

Figure 71P

Westermannia annulata DOHRN, 1860, p. 251.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC

Emesa (Emesa) annulatus: McAtee and Malloch, 1925, p. 40, figs. 48, 49.

The finding of this tropical element in southern Arizona is of special interest, though its encounter in a house seems to make passive introduction a possibility.

Material Examined: *United States:* Arizona: Nogales, June 25, 1954, in house (Noel; United States National Museum), one male. *Mexico*: Veracruz: Presidio, May 30, 1943 (the American Museum of Natural History), one male, one female. *Honduras:* La Libertad, Comayagua, June 28, 2500 feet (J. B. Edwards; Museum of Comparative Zöology), one female. *British Honduras:* Río Grande, November, 1935 [J. J. White; British Museum (Natural History)], one specimen; Río Grande, May 25 (H. S. Parish; Carnegie Museum), one specimen. *Panama:* Canal Zone: Barrow Colorado Island, April 29, 1962 (H. Ruckes; the American Museum of Natural History), one female.

Distribution: United States (Arizona); Mexico; Honduras; Panama.

Type: Unknown.

Emesa mantis (Fabricius)

Gerris mantis Fabricius, 1794, p. 190.
Westermannia mantis: Champion, 1898a, p. 258.
Emesa mantis: Laporte, 1832, p. 84.
Emesa (Emesa) mantis: McAtee and Malloch, 1925, p. 41, figs. 46, 50–53.

Distribution: Jamaica.

Type: Male, British Museum (Natural History).

Emesa marmorata McAtee and Malloch

Figure 71 O, V–X

Emesa (Emesa) marmoratus McAtee and Malloch, 1925, p. 41, figs. 47, 53.

This species is probably not really different from *tenerrima*, a species that McAtee and Malloch (1925) did not know when they described *marmorata*. The only difference observable is the size of the intermediate cell of the forewings, and even so, the determination of individuals is somewhat arbitrary.

Material Examined: *Cuba:* eastern Oriente: mountains north of Imias, July 25–28, 1936, 3000 to 4000 feet (Darlington; Museum of Comparative Zoölogy), one specimen. *Haiti:* Saona, July–August (the American Museum of Natural History), three males.

Distribution: Cuba; Haiti.

Type: Female, United States National Museum.

Emesa mourei Wygodzinsky

Figures 3D; 4J; 6D; 71B–D, F–N, T, Z, AA–CC

Emesa brasiliensis Wygodzinsky, 1945d, p. 247, figs. 1–18 (preoccupied by *Emesa brasiliensis* Dohrn, 1860).
Emesa mourei Wygodzinsky, 1946a, p. 468.

Distribution: Southern Brazil; Paraguay; Peru.

Type: Male, Museu Nacional.

Emesa tenerrima (Dohrn)

Figure 71A, E, Q–S, U

Westermannia tenerrima Dohrn, 1860, p. 251.
Emesa tenerrima: Barber, 1939, p. 387.

McAtee and Malloch (1925) were unable to place this species generically. Its inclusion in *Emesa* by Barber (1939) was not based on the examination of actual specimens. Material that I have examined from Puerto Rico, whence the species was described originally, agrees fairly well with the original

---

Fig. 71 (opposite page). A. *Emesa tenerrima*, female, anterior portion of body, lateral aspect. B–D. *Emesa mourei*. B. Foreleg with color pattern, small spines not shown. C. Detail of posteroventral series of fore femur. D. Apex of fore tibia, with tarsus. E. *Emesa tenerrima*, female, head, seen from above. F–N. *Emesa mourei*, female. F. General aspect, with color pattern. G, H. Claws of foreleg. I. Portion of fore tibia. J. Apex of tarsus and claws of hind leg. K. Forewing. L. Hind wing. M. Setae of abdominal sternite. N. Posterior tarsus. O. *Emesa marmorata*, cells of forewing. P. *Emesa annulata*, cells of forewing. Q–S. *Emesa tenerrima*, male. Q. Cells of forewing. R. Pygophore, seen from behind. S. Apex of abdomen, lateral view. T. *Emesa mourei*, paramere. U. *Emesa tenerrima*, male, apex of abdomen, dorsal view. V–X. *Emesa marmorata*. V. Phallosoma, ventral aspect. W. Phallus, lateral view. X. Phallus, seen from above. Y, Z, AA–CC. *Emesa mourei*, female. Y. Genital region, seen from behind. Z. Apex of abdomen, lateral view. AA. Apex of abdomen, seen from below. BB. Syngonapophysis. CC. Gonocoxite with gonapophysis.

data and shows the correctness of Barber's assumption.

As mentioned above, *marmorata* is possibly not really different from *tenerrima*.

MATERIAL EXAMINED: *Puerto Rico:* Toa-Baja, April, 1915 (G. Garb; the American Museum of Natural History), one male. *Jamaica:* Montego Bay, March, 1911 (the American Museum of Natural History), one female; St. Ann near Schwallenburgh, April 16, 1954 (T. H. Farr; collection Maldonado), one female; Torrington, July 18, 1960 (P. and C. Vaurie; the American Museum of Natural History), one male; St. Ann Parrish: Claremont, July 22, 1960 (P. and C. Vaurie; the American Museum of Natural History), one male. *Cuba:* Soledad near Cienfuegos, August 6–20 (N. Banks; Museum of Comparative Zoölogy), one male.

DISTRIBUTION: Puerto Rico; Jamaica; Cuba.

TYPE: Unknown.

EUGUBINUS DISTANT

Eugubinus DISTANT, 1903e, p. 253.

Falsogardena VILLIERS, 1948, p. 434 (new synonymy).

DESCRIPTION: Macropterous or apterous. Medium-sized to large species (14–24 mm.).

Macropterous form: Body elongate, antennae and legs very delicate. Body surface smooth, not polished, with very short pubescence. Color pattern frequently conspicuous.

Head oval. Anteocular slightly longer than postocular region, sides of latter conspicuously convergent posteriorly, in dorsal and lateral view, but not abruptly separated from neck. Eyes large. Interocular furrow situated at level of center of eyes, almost straight across. Rostrum strongly bent between first and second segments, former slightly shorter than latter, third longest; all subcylindrical. Antennae inserted near apex of head.

Pronotum completely covering mesonotum, elongate, somewhat constricted at middle but not pedunculate. Anterior lobe narrowly elongate, posterior lobe elongate bell-shaped, lacking projections. Scutellum and metanotum without spines and processes.

Forelegs relatively slender. Femora with two series of spiniferous processes, apical spine shorter than process on which it is inserted. Posteroventral series beginning near but not at base of femur, composed of several large and many medium-sized and small processes; the large basal process not distinctly larger than any of remainder. Anteroventral series beginning very slightly apicad of base of other series, composed of medium-sized and small processes similar to those of posteroventral series, widely interrupted at base. Tibiae distinctly shorter than femora, but much more than half as long as latter, ventrally with one series of strongly chitinized denticles of two sizes inserted on short bases. Fore tarsus about one-seventh of length of tibia, both combined distinctly shorter than femur. Tarsus three-segmented, segments of subequal size, not strongly chitinized, with long bristles on all surfaces; distal segment ventrally at apex with three conspicuous, spinelike setae. Claws subequal in size; inner one subbasally on ventral surface with four short blunt processes, outer one incised ventrally at middle, a few much-reduced projections basad of incision. Mid and hind femora and tibiae simple, with microchaetae and macrochaetae, both slender. Tarsal segments subequal in length; claws with a short, rounded, subbasal process and a very strong and elongate perpendicular process at middle below.

Forewings slender, attaining apex of abdomen. Discal cell narrow, elongate; basal cell lacking; subbasal cell present, very small, not more than one-tenth as long as discal cell. Rs well developed. Pterostigma carried almost to wing tip. Hind wing with hamus rather sharply angled toward Sc+R. M-cu cross vein not developed; M meeting Cu directly and confluent with same for a short distance. M and Cu extending beyond level of cross vein to near wing tip, both simple; apical portion of Cu meeting M distally.

Abdomen slender.

Male: Eighth sternite widely exposed. Pygophore rather small, subsemicircular in lateral view, its posterosuperior border with a short, spinelike process. Parameres approximately rod-shaped, slightly curved only, their setae short. Phallus symmetrical. Articulatory apparatus as long as phallosoma, latter subcylindrical, membranous, lacking projections, with a narrow ventral, and in some cases also a dorsal, sclerotization. Endo-

soma lacking projections, its basal portion beset with very numerous tiny spiculae.

Female: Abdomen widening apically. Eighth and ninth tergites subvertical. Genital region not strongly sclerotized.

Apterous male: General characters like those of macropterous form. Head very elongate. Eyes small. Pronotum subcylindrical, anterior lobe elongate, gradually narrowed posteriorly; posterior lobe distinct but very short, covering only extreme base of mesonotum; latter several times as long as wide, slightly convex above, with a not very distinct, median, longitudinal carina. Metanotum narrow, about as long as mesonotum, both combined longer than pronotum. Scutellar or mesonotal spines or processes lacking. Basal spineless section of fore femur about one-fifth as long as article. Abdomen cylindrical. Pygophore elongate in lateral view.

TYPE SPECIES: Of *Eugubinus*, *Eugubinus araneus* Distant (monobasic); of *Falsogardena*, *Falsogardena annulata* Villiers (monobasic).

DISTRIBUTION: Oriental and Ethiopian regions.

OBSERVATIONS: The type species of *Eugubinus* was based on a nymph. In a later paper, Distant (1915) described adults of two additional species. China (see Wygodzinsky, 1953) confirmed that the former and the latter were congeneric.

Usinger (*in litt.*) has examined the type of *Falsogardena annulata* Villiers and found a distinct small basal cell on the forewing. That cell was not mentioned or figured by Villiers, and its presence shows clearly that *Falsogardena* is identical with *Eugubinus*, as all remaining characters agree very closely.

There exists a very definite relationship between members of this genus and spiders; detailed information is found in the general part of this paper.

The available descriptions of most species of *Eugubinus* are short, and it has not been possible to examine specimens of all described species. The following key is based necessarily on superficial characters and should be used with extreme caution. The type species, *araneus*, could not be included.

KEY TO THE SPECIES OF *Eugubinus*

1. Size, more than 20 mm.; apterous; basal fourth of fore femur devoid of spines (fig. 72CC) . . . . . *canalanus*
   Size, less than 20 mm.; winged; spines of fore femur beginning almost at base of segment (fig. 72C) 2
2. Size, 17 mm.; sides of head emarginated laterally behind eyes; fore femur dark, with one broad, subapical, white annulus removed from apex by its own length; pronotum dorsally with 1+1 anteriorly converging, whitish bands . . . . . *leleupi*
   Size, less than 17 mm.; different combination of characters 3
3. Head piceous, with a wide, pale fascia laterally between eyes and base of antennae; fore femora dark, dorsally with two submedian whitish spots; third segment of rostrum whitish . . . . . *annulatus*
   Color pattern different 4
4. Apices of posterior femora black . . *reticolus*
   Apices of posterior femora white 5
5. Pronotum uniformly black . . . *intrudans*
   Pronotum not uniformly black 6
6. Second segment of antennae with two light annuli; veins of basal portion of forewings pale, of apical portion piceous . . *forsteri*
   Second segment of antennae with more than two pale annuli; veins of forewings uniformly piceous . . . . . *papuensis*

Eugubinus annulatus (Villiers), new combination

Falsogardena annulata VILLIERS, 1948, p. 435, figs. 832–837.

DISTRIBUTION: Congo (Léopoldville); Congo (Brazzaville); Cap Verde Islands.

TYPE: Male, Muséum National d'Histoire Naturelle.

Eugubinus araneus Distant

Eugubinus araneus DISTANT, 1903f, p. 253.

This is a nymph, figured by Distant (1903e).

DISTRIBUTION: India.

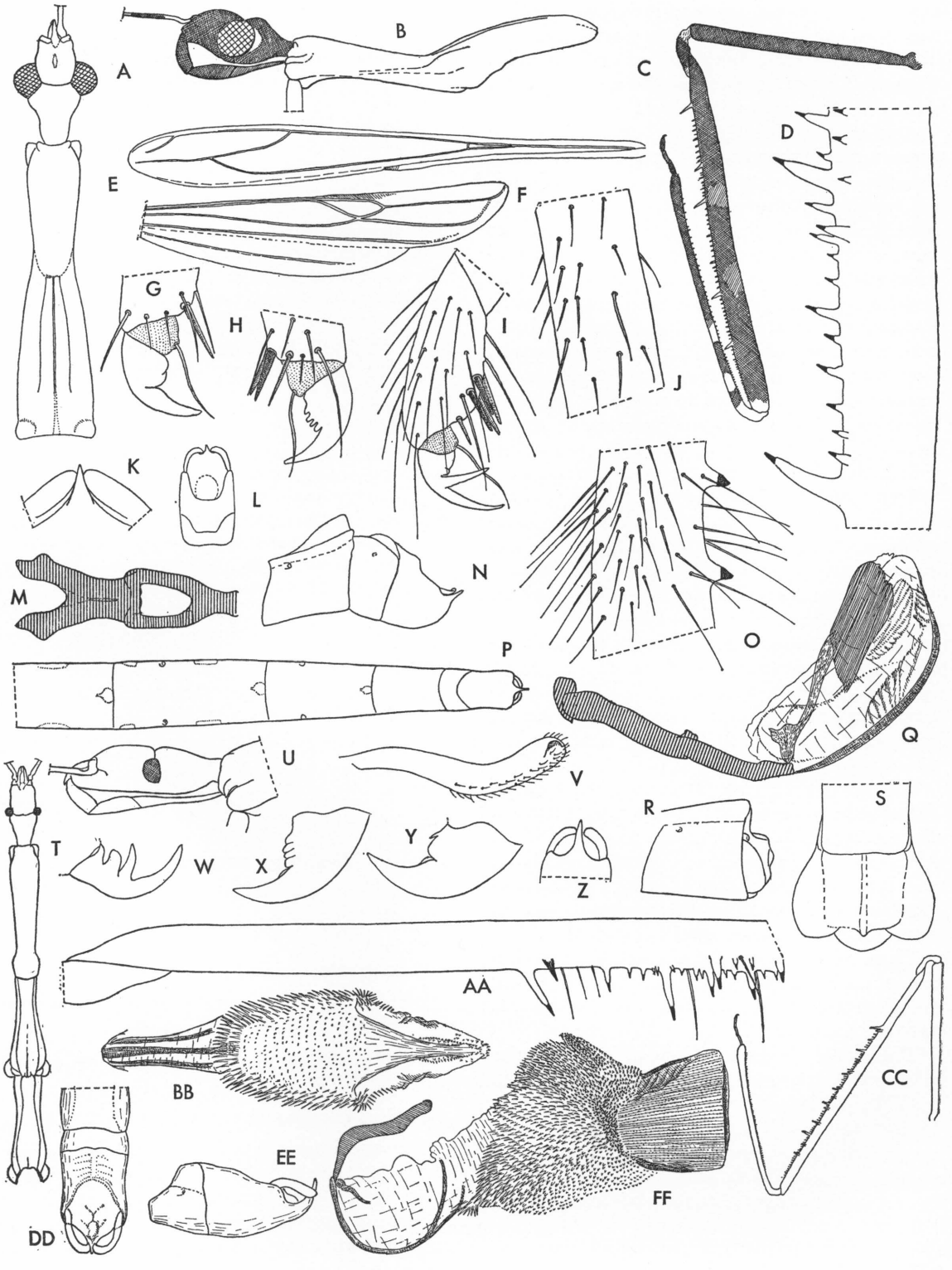
TYPE: Nymph, British Museum (Natural History).

Eugubinus canalanus (Distant), new combination

Figure 72T–Z, AA–FF

Gardena canalana DISTANT, 1914, p. 385, fig. 3.

The specimens that I have examined agree well with the short description given by Distant (1914). The figure of the general aspect accompanying the original description is here supplemented by drawings of some morphological details. *Eugubinus canalanus* dif-


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF

fers from the other species of *Eugubinus*, all fully winged, by such characters as the much more elongate and slender head and the lack of spines on large basal portion of the fore femur. These characters, together with the slender shape of the insect, give it a rather striking resemblance to apterous members of *Gardena*. The armature of the fore femora and the structure of the tarsi and claws of all pairs of legs, as well as the male genitalia, show that the species belongs to *Eugubinus*.

MATERIAL EXAMINED: New Caledonia: Noumea, April, 1956 (J. Rageau; Institut Français d'Océanie), one male; (J. Rageau; the American Museum of Natural History), one male.

DISTRIBUTION: New Caledonia.

TYPE: British Museum (Natural History).

Eugubinus forsteri Wygodzinsky

Eugubinus forsteri WYGODZINSKY, 1953, p. 214, figs. 1–14.

This species occurs on New Caledonia, as does the foregoing species. It cannot be the macropterous form of the apterous *canalanus*, as it is much smaller (14 versus 24 mm.), the light-colored annuli of the mid and hind legs are much more numerous, and the forelegs are much stouter.

DISTRIBUTION: New Caledonia.

TYPE: Female, Dominion Museum.

Eugubinus intrudans Distant

Eugubinus intrudans DISTANT, 1915, p. 8.

DISTRIBUTION: South India.

TYPE: Unknown.

Eugubinus leleupi (Villiers), new combination

Falsogardena leleupi VILLIERS, 1949a, p. 145, figs. 1, 2.

Though the forewings were neither described nor figured, it seems safe to follow Villiers and regard *leleupi* as congeneric with *annulatus*.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Unknown.

Eugubinus papuensis, new species

Figure 72A–Q

DESCRIPTION: Macropterous male: Length, 15.2 mm.; head, 1.3; thorax, 4.6; abdomen, 9.3; forewings, 7.7 mm.

General color piceous. Head yellowish behind eyes, and with a small ovate spot dorsally on anteocular region. Rostrum piceous, somewhat lighter on apex of second and on third segment. First segment of antennae with about seven moderately wide white annuli, dark portions wider than light ones, irregularly mottled with yellowish. Second segment with about five to six whitish annuli; third with one basal annulus. Hind lobe of pronotum with a narrow, median, longitudinal, yellowish line which is more conspicuous before hind margin. Fore trochanter partly yellowish; femur with a whitish apical annulus and two incomplete yellowish submedian annuli; small processes dark, larger one white. Tibiae with one basal, and two incomplete subbasal, whitish annuli. Coxae and trochantera of mid and hind legs dark, with small, light-colored regions. Femora with four to five rather broad, whitish annuli, one apical, intervening spaces narrowly annulated with yellowish and fuscous; apical white preceded by a rather wide piceous annulus. Tibiae with rather numerous piceous and whitish annuli subequal in length. Forewings fuscous, translucent, faintly iridescent, with an almost imperceptible, darker, coarsely

---

FIG. 72 (OPPOSITE PAGE). A–Q. *Eugubinus papuensis*, male. A. Head and pronotum, seen from above. B. Head and prothorax, lateral view; color pattern shown on head only. C. Foreleg, with color pattern. D. Base of fore femur. E. Forewing. F. Hind wing. G, H. Praetarsus and claws of foreleg. I. Apical tarsal segment and one claw of hind leg. J. Portion of hind femur. K. Apex of pygophore, seen from behind. L. Genital region, seen from above. M. Articulatory apparatus. N. Apex of abdomen, lateral view. O. Portion of fore tibia. P. Abdomen, seen from below; light-colored spots indicated by stippled outlines. Q. Phallus, lateral view. R, S. *Eugubinus* sp., female, Anambas Island. R. Genital region, lateral view. S. Genital region, dorsal aspect. T–Z, AA–FF. *Eugubinus canalanus*, male. T. Head and thorax, dorsal view. U. Head, lateral view. V. Paramere. W. Claw of hind leg. X, Y. Claws of foreleg. Z. Apex of pygophore, seen from behind. AA. Base of fore femur. BB. Phallus, ventral aspect. CC. Foreleg. DD. Apex of abdomen, dorsal view. EE. Genital segments, lateral view. FF. Phallus, lateral aspect.

reticulate, veinlike pattern; all veins uniformly piceous. Abdomen piceous, spiracles and regularly arranged ventral spots flavescent. Parameres flavescent.

Head as shown in figure 72A, B; anteocular region one and one-half times as long as postocular. Eyes large; interocular distance dorsally very slightly larger than width of eye; in lateral view eyes not attaining ventral surface of head. Rostrum as shown in figure 72B, first and second segments very slightly incrassate only. First and second segments of antennae with hairs in moderate number, not much longer than diameter of segment. Length of first segment, 6 mm.; relative length of segments, 1/0.85/0.1/?.

Pronotum as shown in figure 72A, B, slender; fore lobe five-sixths as long as hind lobe, only slightly widened anteriorly; posterior lobe along center with a narrow, shelflike elevation, limited laterally by distinct carinae which are evanescent on posterior third; a less distinct carina along middle; lateral carina of anterior lobe distinct.

Forelegs slender, as given in generic description and shown in figure 72C, D, G, H, O. Coxae two-thirds as long as pronotum. Posteroventral series of femur with four large, and 55 to 60 medium-sized and small, spiniferous processes; anteroventral series with one or two short processes basad of interruption, rest of series composed of about four large and 40 to 45 short processes. Tibia ventrally with about 45 denticles inserted on short bases. Tarsus and claws as given in generic description and shown in figure 72G, H. Mid and hind legs as given in generic description and shown in figure 72I, J; hind femora surpassing apex of abdomen by 3.5 mm.

Apex of forewings falling short of tip of abdomen by about 2.5 mm., their shape and venation as shown in figure 72E. Hind wings as shown in figure 72F.

Abdomen slender, connexival angles of seventh segment somewhat projecting (fig. 72N); genital region as shown in figure 72K, L, N, P. Parameres slender, slightly curved, with short bristles. Phallus and basal plates as shown in figure 72M, Q.

MATERIAL EXAMINED: New Guinea: Papua: Kokoda, May, 1933, in cobweb, 1200 feet [L. E. Cheesman; British Museum (Natural History)], one male holotype, one male lacking head.

OBSERVATIONS: In addition to the characters mentioned in the key, *E. papuensis* differs from *E. forsteri* by the more slender abdomen. When the male of *forsteri* becomes known, additional differential characters may be found.

Eugubinus reticolus Distant

Eugubinus reticolus DISTANT, 1915, p. 8.

DISTRIBUTION: India.

TYPE: Unknown.

Eugubinus spp.

Several specimens of *Eugubinus*, unidentified at the present time, are enumerated below, as they represent interesting additional locality records for this poorly known genus.

The genital region of the female from the Anambas Islands is illustrated (fig. 72R, S).

MATERIAL EXAMINED: *Anambas Islands, South China Sea:* [P. Stanton, F. N. Chasen; British Museum (Natural History)], one female. *Malaya:* Kuala Lumpur, 1936 [British Museum (Natural History)], one specimen. *New Guinea:* Simbang, Huon Gulf, 1899 (Biro; Hungarian National Museum), one female. *Gold Coast:* Enchi [Capt. B. D. Peake; British Museum (Natural History)], one specimen.

GARDENA DOHRN

Gardena DOHRN, 1859, p. 252 (*nomen nudum*).
Gardena: DOHRN, 1860, p. 214.
Lutevopsis CHAMPION, 1898a, p. 166 (part) (new synonymy).

DESCRIPTION: Macropterous, brachypterous, or apterous. Short and stout to long and slender insects. Small to large-sized species (9–27 mm.).

Body surface dull to highly polished, in some cases rugose, in no case tuberculate or granulate. Bristles short and sparse, of uniform size, or divided into microchaetae and only slightly larger macrochaetae. General color dark, concolorous, rarely thorax bicolorous; legs frequently annulated; complex color pattern not developed.

Macropterous form: Head elongate, anteocular region slightly shorter than postocular with neck; postocular region with sides gradually or strongly converging posteriorly,

rarely distinctly constricted before neck. Eyes small to medium-sized, almost circular in outline. Interocular furrow not surpassing level of posterior border of eyes. Rostrum slender, segments not conspicuously thickened; first very short, not reaching much beyond level of apex of antenniferous tubercle, second reaching at most to level of center of eyes, third longest; rostrum slightly bent between first and second segments. Antennae inserted near apex of head.

Pronotum completely covering mesonotum, stout to elongate, more or less pedunculate; fore lobe subcylindrical to clavate, on its posterior portion frequently with a median longitudinal sulcus; posterior lobe slightly to considerably shorter and much wider than fore lobe, separated from anterior lobe by a more or less distinct constriction. Scutellum small, not spined or tuberculate; metanotum lacking projection.

Forelegs from relatively short to very slender and elongate. Femora virtually parallel-sided; spined portion covering from about one-half of to almost whole under surface of article, composed of several large and medium-sized and numerous small, spiniferous processes, respective spines longer than processes, large spines of uniform size; spiniferous processes transformed into small teeth at apex of femur. Anteroventral series not interrupted at base, beginning somewhat apicad of base of posteroventral series, composed of very delicate, spinelike setae intermixed with shorter but also delicate spines. Tibia from slightly less to considerably more than half as long as femur, ventrally with a single row of beak-shaped to peglike teeth. Tarsus from one-fourth to one-fifth as long as tibia, both combined considerably shorter than femur. Three tarsal segments, subequal in size, hairy on all surfaces, first segment ventrally with a series of progressively longer spiniform setae. Claws subequal in size, inner one on under surface with a medially incised lamella, outer one with three to four subbasal teeth. Mid and hind legs slender, posterior femur distinctly surpassing apex of abdomen; femora with numerous short setae, in certain species interspersed with not very numerous macrochaetae; first tarsal segment longer than second or third. Claws slender, slightly curved about middle, with a medially incised, ventral lamella.

Forewings simply rounded apically, in no case attaining tip of abdomen, frequently reaching to middle or posterior third of abdomen only. Only discal cell present, its apex carried farther to wing tip than in most genera of the tribe; M and Cu completely fused basad of cell, thus a single vein connecting base of cell to axillary region. Pterostigma approaching but not attaining wing tip. Hind wings attaining apex of forewings. Hamus rather abruptly angled toward Sc+R. M-cu cross vein developed in a single species only, short, perpendicular to longitudinal axis of wing. In all other cases, M meeting Cu apicad of level of caesura and remaining fused to Cu for a short distance. R+M and Cu projecting beyond level of cross vein to wing border, simple, not subdivided and not connected to each other. Anal lobe about three-fourths as long as wide.

Abdomen from suboval to slender and elongate, in former case widest on posterior third.

Male: Structure of genital segments and phallus varied (see below under discussion of species groups), but phallus invariably symmetrical.

Female: Dorsal surface of genital region formed by posteriorly inclined complex of eighth, ninth, and apparently tenth tergite. Eighth tergite subsemicircular to almost transverse; ninth larger than eighth, subpentagonal, its lateral extension very reduced. Apparent tenth smaller than either of foregoing, transverse. Center of seventh sternite from straight to slightly or strongly projecting posteriorly. Gonocoxites distinctly separated; gonapophyses well developed, in a few species partly fused to gonocoxites. Syngonapophysis shallowly emarginate posteriorly.

Brachypterous form: General characters of macropterous form, but forewings not extending much beyond base of abdomen, hind wings correspondingly reduced. Posterior lobe of pronotum still covering mesonotum to base of scutellum, but more or less narrowed and in some cases not attaining sides of mesonotum.

Apterous form: General characters like those of winged form. Pronotum pedunculate, its hind lobe very short, not covering mesono-

tum. Mesonotum and metanotum subrectangular, somewhat longer than wide, mesonotum longer than metanotum, combined somewhat shorter than pronotum.

TYPE SPECIES: Of *Gardena*, *Gardena melinarthrum* Dohrn (monobasic); of *Lutevopsis*, *Lutevopsis longimanus* Champion (by subsequent designation, Kirkaldy, 1907).

DISTRIBUTION: All zoogeographical regions.

OBSERVATIONS: The genus *Gardena* was named by Dohrn in 1859, with the Ceylonese *melinoarthrum* (*sic*) as the only species included, but this species and the genus itself were not described by Dohrn until 1860. Numerous additional species of *Gardena* have since been described from many parts of the world. McAtee and Malloch (1926) called attention to the fact that the (external) genitalia of Oriental *Gardena* are more like those of the American *Emesaya* than those of American *Gardena*, thus hinting at a possible lack of unity in the genus. It can now be shown that *Gardena* does indeed contain several more or less sharply defined species groups, though none of them is related to *Emesaya*. It has not been possible to give these species groups independent generic status, as there are various transitional forms, and no clear-cut characters could be found that would allow in all cases unequivocal placement of the females in a given group. The male genitalia have furnished the prime characters for this division. It has thus also become necessary to synonymize *Lutevopsis* with *Gardena*. The following four species groups are established:

Melinarthrum GROUP

Medium-sized to large species (18.5–25 mm.), winged or apterous. Fore femur very slender (fig. 73F), basal spineless region at least about one-third of total length of article; tibia less than half as long as femur.

Pygophore slightly compressed laterally, its anterior dorsal bridge short; posterosuperior process present, pointed. Seventh tergite attaining or almost attaining apex of pygophore from above. Parameres slightly clavate, curved, inserted at superolateral region of pygophore near border of same, their curvature accompanying margin of pygophore, meeting behind. Phallus of normal size. Articulatory apparatus short and stout. Basal plate struts fused into an upwardly directed, slender, apically emarginated sclerite. Phallotheca wall ventrally with 1+1 sublateral, elongate, sclerotized regions, dorsally above apical two-thirds of struts with a single broad semielliptical sclerotization. Endosoma tubular, with 1+1 lateral fasciae of very numerous, delicate, spinelike projections.

SPECIES INCLUDED: *Melinarthrum*, *hirticornis*, *fuliginosa*. Species probably belonging here: *gabonensis*, *sjostedti*, *viettei*.

DISTRIBUTION: Oriental and Ethiopian regions.

Brevicollis GROUP

Small to medium-sized insects (10–20 mm.); winged or apterous.

Fore femur stout (fig. 73FF) to slender; basal spineless region from about one-seventh to one-third of total length of article; tibia slightly more than half as long as femur. Fore lobe of pronotum separated from hind lobe frequently by a transverse cleft.

Pygophore like that of *melinarthrum* group, but with process spinelike to laminate; projection of seventh tergite and parameres like those of *melinarthrum* group.

Articulatory apparatus, basal plate struts, ventral sclerotization of phallotheca and endosoma much like those of *melinarthrum* group, dorsal sclerotization of phallotheca in shape of 1+1 small, backwardly directed areas originating at level of apex of struts.

SPECIES INCLUDED: *Brevicollis*, *cheesmanae*, *geniculata*, *kivuensis*, *lamottei*, *leleupi*, *muscicapa*. Species probably belonging here: *araneophila*, *catenaria*, *globuliceps*, *longipes*, *orientalis*.

DISTRIBUTION: Australian, Oriental, and Ethiopian regions.

Longimana GROUP (=*Lutevopsis* CHAMPION)

Small-sized (9–11 mm.), fully winged species.

Fore femur relatively short and stout (fig. 75F), spines beginning at a very short distance from base of article. Tibia at least two-thirds as long as femur. Fore lobe of pronotum separated from hind lobe by a transverse cleft.

Anterior bridge of pygophore short; posterosuperior border of pygophore emarginated

at middle (fig. 76I). Seventh tergite attaining apex of pygophore. Parameres slender, elongate, sharply inwardly curved at apex (fig. 76G, K).

Articulatory apparatus short and stout; basal plate struts fused at short distance from base, apically prolonged into 1+1 rodlike sclerites elevated above dorsal wall of phallotheca. Ventral sclerotizations of phallotheca lacking. Endosoma rather short, subcylindrical, dorsal and ventral wall each subapically with a laterally compressed rugose sclerotization; interior of endosoma with 1+1 faintly visible, longitudinal, rodlike structures.

SPECIES INCLUDED: *Elkinsi*, *longimana*.

DISTRIBUTION: Nearctic Region.

Pipara GROUP

Medium to large-sized (13–26 mm.), winged or apterous.

Fore femur slender, spineless region at least one-third of total length of segment; tibia from one-half to somewhat less than one-half of length of femur.

Dorsal bridge of pygophore occupying from one-half to two-thirds of total length of segment, more or less deeply cleft posteriorly; posterosuperior border lacking median projection, either straight across, or more or less deeply emarginated or excised; posterolateral angles of pygophore often projecting. Center of seventh tergite from very slightly to considerably salient behind, generally leaving largest part of dorsal surface of pygophore uncovered, only rarely reaching to apex of latter. Parameres inserted somewhat dorsally before posterolateral angles of pygophore, short, greatly modified in shape and structure (fig. 77K, N, P, T), upwardly, backwardly, or inwardly directed, in no case elongate so as to meet behind.

Articulatory apparatus short and stout. Basal plate struts fused into a single upwardly directed sclerite which meets base of a central sclerotization of dorsal wall of phallotheca; ventral sclerotization of phallotheca narrow, elongate (fig. 78C); phallotheca, furthermore, with complex, dorsolateral, in some cases bipartite sclerotizations (figs. 77S; 78A–E).

Seventh sternite of female often with a median projection (fig. 77G).

SPECIES INCLUDED: *Agrippina*, *americana*, *barbiellinii*, *caesonia*, *crispina*, *denieri*, *domitia*, *eutropia*, *faustina*, *marcia*, *pipara*, *poppaea*, *pyrallis*.

DISTRIBUTION: Neotropical Region.

It was impossible to include the following species even tentatively in any group: *bicolor*, *insignis*, *pacifica*, *seychellensis*, *strangulata*, and *tuberculata*.

Though the different species groups of *Gardena* differ considerably in the structure of the male copulatory organs, they agree in such synapomorphic characters as the simplified anteroventral series of the fore femur, the frequent presence of a longitudinal furrow on the fore lobe of the pronotum, the often highly polished surface of certain parts of the body, and the well-developed apparently tenth tergite in the females. The peculiar arrangement of the testes was also found to agree among representatives of different species groups.

The *brevicollis* group can be said to approach the plesiomorphic condition of the group: rather short body, pronotum and forelegs in no case extremely elongate, spineless region of forelegs relatively short, fore tibia more than half as long as femur, forewings surpassing middle of abdomen, apterous forms very rare, parameres simple in structure, phallotheca with paired sclerotizations of dorsal and ventral wall, and endosoma simply cylindrical, with numerous slender, spinelike projections. This group occupies the Oriental and Australian as well as the Ethiopian regions, in the last-named being concentrated significantly in the highlands of east Africa and in South Africa.

The *melinarthrum* group can be considered as being directly derived from an ancestor resembling the *brevicollis* group. The main difference resides in a progressive lengthening of the body and appendages, with a reduction of the size of the spined portion of the fore femur, and a concomitant shortening of the fore tibia; the only modification of the phallus is the fusion of the sclerotizations of the dorsal surface of the phallotheca and the widening of the resulting sclerite. The *melinarthrum* group is found in the Oriental Region and in central and west Africa.

The *longimana* group is based on the type species of *Lutevopsis* Champion and a very

nearly related new species, both restricted to the southern and western United States and to Mexico. The numerous plesiomorphic characters, such as the short body and appendages, the long wings, the great extension of the spined sector of the fore femur, and the elongate fore tibia, give these insects a considerable resemblance to those of the *brevicollis* group, but the very peculiar phallus and the modified parameres show that this group is clearly apomorphic, and make it impossible to place the plesiomorphic *muscicapa* and *chinai* in the same group, as has been done by Bergroth (1906a) or as suggested by Wygodzinsky (1952c).

The *pipara* group, containing several undescribed as well as named species, is clearly apomorphic in all main characters: elongate body with slender appendages, reduction of the spined section of the fore femur and a considerably shortened fore tibia, relatively short wings, with a frequent brachypterous or apterous condition, the often-shortened and invariably narrowed apical projection of the seventh tergite, the highly modified pygophore, which invariably lacks a posterior process, the often extraordinarily shaped parameres, which are unique in the subfamily, and the highly complex phallus. This group is widespread on the American continent, though limited to its tropical and subtropical regions.

Not enough is known about *Gardena* for us to arrive at a correct interpretation of its phylogenetic and geographical history. All that can be stated at the present time is that the Old World tropics possess two about equally well-developed species groups, neither very highly specialized, whereas in the Western Hemisphere there are one small relict group of basically Sonoran distribution and one very well-developed and clearly dominant, highly apomorphic species group that ranges over the warmer areas of the whole continent. The single species from the Palearctic Region, which I have not examined, cannot be placed in the present scheme.

The following key is based on that given by McAtee and Malloch (1925). One must consult that paper when using the present key, especially for the figures of the structural characters of the male genital region and the shape of the parameres.

KEY TO THE NEW WORLD SPECIES OF *Gardena*

1. Spines of fore femur beginning very close to base of article (fig. 75F); general body shape stout (fig. 75A); fore lobe of pronotum little if any longer than hind lobe (figs. 75B; 76A) 2
   Spines of fore femur beginning at considerable distance from base of article (as shown in figs. 73FF; 74D); body elongate (as shown in fig. 74A); fore lobe of pronotum much longer than hind lobe (as shown in figs. 73A; 74A) 3
2. Reddish testaceous, without any distinct markings, venter of abdomen darkest; fore lobe of pronotum widest (fig. 76A) and highest (fig. 76B) on anterior third; eyes large (fig. 76A, B), postocular region of head rather abruptly constricted before neck in dorsal view (fig. 76A) . . *elkinsi*
   General color piceous; some regions ferruginous; fore lobe of pronotum widest at center in dorsal (fig. 75B), its height uniform in lateral (fig. 75C), view; eyes small (fig. 75A–C); postocular region of head with sides rather gradually convergent posteriorly in dorsal view (fig. 75A, B) . . . . . *longimana*
3. Males 4
   Females 14
4. Fore lobe of pronotum sulcate in center behind; posterior lobe usually transversely wrinkled anteriorly 5
   Fore lobe of pronotum not sulcate in center behind; hind lobe in some cases but not invariably without transverse wrinkles 12
5. Hind margin of pygophore more or less sinuate or emarginate in middle when seen from behind (fig. 77 O); seventh tergite with a long, slender process 6
   Hind margin of pygophore virtually straight; process of seventh tergite shorter and usually more rounded (fig. 77D) 8
6. Hind border of pygophore broadly but shallowly emarginated when seen from behind; superoposterior angles of pygophore but little elevated above hind margin . . . . . *crispina*
   Hind border of pygophore deeply incised when seen from behind (fig. 77 O); posterolateral angles projecting much above hind margin 7
7. Posterior incision of pygophore subtriangular when seen from behind (fig. 77 O); projection of seventh tergite longer than half of length of pygophore . . . . *americana*
   Posterior incision of pygophore subsemicircular, 1+1 teeth at base of emargination;

projection of seventh tergite not longer than half of length of pygophore . . . *poppaea*

8. Apex of paramere circularly curved; superoanterior angle not produced (fig. 77T) . . . . . *domitia*
   Apex of paramere not circularly curved, superoanterior angle produced 9
9. Paramere fitting into a groove which extends forward on outer side of pygophore below its superoposterior angle; posterior angle of paramere a weak hook, process of anterior angle much stouter . . . . . *eutropia*
   Paramere not fitting into such a groove, and of different shape 10
10. Both branches of paramere slender; superoposterior angle of pygophore spinelike . . . . . *marcia*
    Both branches of paramere stout (fig. 77K); superoposterior angle of pygophore obtuse 11
11. Antennae copiously hairy; posterior lobe of pronotum strongly wrinkled in front, granulate-rugose behind . . . . *pipara*
    Antennae not hairy; posterior lobe of pronotum only slightly wrinkled in front, almost smooth behind . . . . . *pyrallis*
12. Hind margin of pygophore deeply emarginated; seventh tergite with a moderately slender projection at center . . . *poppaea*
    Hind margin of pygophore slightly or not at all emarginated; seventh tergite either simply convex behind or with a broadly triangular process 13
13. Posterior lobe of pronotum much more than half as long as relatively stout fore lobe, bearing three yellow pale vittae; forewings almost uniformly stramineous in color; seventh tergite with a broadly triangular process; paramere circularly curved, much as in *domitia* (see fig. 77T) . . . *agrippina*
    Posterior lobe of pronotum not half as long as very slender anterior portion, uniformly dark-colored; bases of forewing much paler than remainder; seventh tergite convex posteriorly but not produced; paramere not circularly curved (fig. 77P) . . . *faustina*
14. Fore lobe of pronotum sulcate in center posteriorly; hind lobe distinctly wrinkled anteriorly; seventh sternite conspicuously produced behind at middle 15
    Fore lobe of pronotum not sulcate in center posteriorly; hind lobe not distinctly transversely wrinkled; seventh sternite convex behind, but not produced apically (fig. 77M) . . . . . *faustina*
15. Seventh sternite with a short, rather acute process at middle of posterior margin 16
    Seventh sternite with a longer process (fig. 77G) 17
16. Coxae of mid and hind legs light reddish brown; fore tibia not more than half as long as femur, latter extremely slender, about 35 times as long as wide . *denieri*
    Coxae of mid and hind legs black; fore tibia distinctly more than half as long as femur, latter less slender, hardly more than 20 times as long as wide . . . . . *poppaea*
17. Process of seventh sternite broad, its apex rounded and not reaching tip of abdomen . . . . . *americana*
    Process of seventh sternite long and slender (fig. 77G), reaching virtually to apex of abdomen . . . . . *pipara, domitia*

Gardena barbiellinii has not been included in the key, owing to insufficient data.

Key to the Oriental and Australian Species of *Gardena*

1. Distance from first spine of fore femur to base of article equal to twice or three times length of spine combined with its basal tubercle (fig. 74Z) 2
   Distance from first spine of fore femur to base of article much greater than three times length of spine with its basal tubercle (fig. 73F) 3
2. First article of antennae of male with dense hairs several times as long as diameter of segment, on its whole length; fore and hind lobe of pronotum separated dorsally by a very narrow cleft (fig. 74S); fore lobe with very dense pile, appearing dull; hind lobe with posterior border slightly emarginated (fig. 74S); last tergite of male relatively wide, subrounded apically (fig. 74V) . . . . . *muscicapa*
   First article of antennae of male on basal half with not very numerous hairs which are not much longer than diameter of segment; fore and hind lobe of pronotum separated dorsally by a rather extensive depression (fig. 74R); fore lobe almost without pile, appearing polished; hind lobe bisinuate at base (fig. 74R); last tergite of male rather slender, subpointed apically (fig. 74W) . . . . . *cheesmanae*
3. Mid and hind femora uniformly yellowish . . . . . *pacifica*
   Mid and hind femora not concolorous . . 4
4. Apterous, hind lobe of pronotum not covering mesonotum completely (fig. 74T) . . . 5
   Winged (macropterous, brachypterous, or micropterous), hind lobe of pronotum normally developed, completely covering mesonotum (fig. 73A–C) 7

5. Size, 15 mm.; margin of hind lobe of pronotum conspicuously rounded (fig. 74T) . . . . . *catenaria*
   Size, 20–25 mm.; margin of hind lobe of pronotum truncate and slightly emarginate (as shown in fig. 74A) 6
6. Size, 20 mm.; apex of fore femur and base of fore tibia sordid white; fore tibia somewhat more than half as long as femur . . . . . *geniculata*
   Size, 25 mm.; fore femur and tibia lacking white annuli; fore tibia distinctly shorter than half of length of femur . . . . . *melinarthrum*
7. Size, less than 20 mm.; distance from base of first spine of fore femur to base of article at most five times length of spine combined with its base; fore tibia slightly more than half as long as femur (fig. 73FF); fore lobe of pronotum less than twice as long as hind lobe, separated from latter by narrow, transverse cleft (fig. 73EE); last tergite of male subtriangular apically (fig. 73DD) . . . . . *brevicollis*
   Size, more than 20 mm.; distance from base of fore femur to insertion of first spine at least 10 times length of said spine with its basal tubercle; fore tibia somewhat less than half as long as femur (fig. 73F); fore lobe of pronotum about twice as long as hind lobe, not separated from latter by a cleft (fig. 73A); last tergite of male tongue-shaped apically (fig. 73 O) . *melinarthrum*

Gardena bicolor and *seychellensis* have not been included, owing to the lack of sufficient data.

KEY TO THE ETHIOPIAN SPECIES OF *Gardena*

1. Apterous; pronotum not covering mesonotum (fig. 74A) 2
   Winged (macropterous, brachypterous, or micropterous); hind lobe of pronotum completely covering mesonotum (fig. 74S) 4
2. Total length of pronotum less than four times its maximum width in dorsal view; antennae and femora and tibiae of mid and hind legs annulated with light and dark . . . . . *viettei*
   Total length of pronotum about five times its maximum width in dorsal view (fig. 74A); antennae and legs bicolorous, but not annulated 3
3. Abdomen completely black . . . *fuliginosa*
   Abdomen fuscotestaceous, extreme base and apical half black . . . . . *sjostedti*
4. Length, 11–12 mm.; fore tibia slightly more than half of length of femur; only basal eighth of femur devoid of spines (as shown in fig. 74Z); pronotum relatively short, hind lobe wide, separated from front lobe by a distinct, transverse cleft (fig. 74S) . . . 5
   Length, at least 15 mm.; fore tibia generally not longer than half of length of femur; basal spineless section of fore femur in most cases larger than one-eighth of total length of article; pronotum more elongate . . . 6
5. Fore lobe of pronotum with median longitudinal furrow (fig. 74S) . . . . *muscicapa*
   Fore lobe of pronotum lacking median longitudinal furrow . . . . . *kivuensis*
6. Postocular region of head semiglobular, its sides forming a distinct angle with neck (as shown in fig. 74R) 7
   Postocular region of head with sides gradually converging posteriorly (as shown in fig. 74A) 9
7. Hind lobe of pronotum long and narrow, its sides subparallel, disc bordered by 1+1 convergent carinae meeting anteriorly . . . . . *strangulata*
   Sides of hind lobe of pronotum slightly convergent posteriorly, lacking carinae mentioned 8
8. Eyes in dorsal view about as wide as interocular space; hind lobe of pronotum about four-fifths as long as rest of pronotum . . . . . *araneophila*
   Eyes in dorsal view not more than half as wide as interocular space; hind lobe of pronotum not more than two-thirds as long as rest of pronotum . . . . . *globuliceps*
9. Forewings only slightly surpassing middle of abdomen 10
   Forewings reaching to apical fourth of abdomen 14
10. Posterior femora about twice as long as abdomen . . . . . *longipes*
    Posterior femora one and one-half times as long as abdomen 11
11. Postocular region of head dorsally at center with a small, smooth, flavous tubercle at border of interocular furrow. . *tuberculata*
    Head lacking tubercle mentioned 12
12. Abdomen piceous 13
    Abdomen reddish, forelegs light red . . . . . *gabonensis*
13. Fore lobe of pronotum relatively elongate; hind border of posterior lobe slightly convex between humeral angles, sides of hind lobe strongly converging posteriorly . . . . . *leleupi*
    Fore lobe of pronotum relatively short; hind border of posterior lobe uniformly concave between humeral angles, sides of hind lobe

only slightly converging posteriorly . . . . . *lamottei*

14. General body color reddish brown, abdomen darkened; legs uniformly flavous . . . . . *garambana*

General body color yellowish or reddish brown, with parts of thorax piceous; mid and hind femora with apex white . . .15

15. First segment of antennae of male with numerous long hairs; process of posterosuperior border of pygophore in shape of a slender spine . . . . . *hirticornis*

First segment of antennae of male with shorter and less numerous hairs; process of pygophore with a rounded laminate projection which is concave behind . . *orientalis*

The foregoing key is based in part on color and purely meristic data; a more satisfactory key must use mainly morphological characters, especially those of the external genitalia of the male.

Gardena agrippina McAtee and Malloch

Gardena agrippina McAtee and Malloch, 1925, p. 73.

Distribution: Bolivia.
Type: Male, Carnegie Museum.

Gardena americana Champion

Figures 77N, O; 78B, E

Gardena americana Champion, 1898a, p. 167, pl. 10, fig. 12 (part).
Gardena caesonia McAtee and Malloch, 1925, p. 70, fig. 113 (new synonymy).

Champion (1898a) included several species in his type series. McAtee and Malloch (1925) definitely fixed the concept of *americana*. The latter authors suggested that their *caesonia*, known from female specimens only, may be the female of *americana*, at that time known in the male sex only; this suggestion is accepted here.

The species is known from macropterous and micropterous specimens; in the latter, the wing pads reach only the base of the metanotum, but the pronotum is normally developed.

For comparative purposes, the paramere and phallus of the species are figured here.

Material Examined: *Mexico:* San Luis Potosi: Tamazunchale, Quinta Chilla, December 20, 1948 (H. B. Leech; the California Academy of Sciences), two macropterous males. *British Honduras:* San Antonio, June, 1931 (J. J. White; the American Museum of Natural History), one micropterous female, identified by J. C. Lutz as *Gardena americana*. *Venezuela:* San Esteban, June 1, 1940 (Anduze; the California Academy of Sciences), one macropterous male. *Colombia:* Bogotá (Naturhistorisches Museum,Vienna), one micropterous male, identified by Signoret as *aeneus* [manuscript name].

Distribution: Mexico; Guatemala; Nicaragua; British Honduras; Panama; Colombia; Venezuela.

Types: Of *americana*, British Museum (Natural History); of *caesonia*, female,United States National Museum.

Gardena araneophila Villiers

Gardena araneophila Villiers, 1962a, p. 888, figs. 7–9.

Distribution: Congo (Brazzaville).
Type: Unknown.

Gardena barbiellinii Piza

Gardena barbiellinii Piza, 1944, p. 137, figs. 3, 4.

Distribution: Brazil (São Paulo).
Type: Collection Piza.

Gardena bicolor Distant

Gardena bicolor Distant, 1903e, p. 214, fig. 152.

McAtee and Malloch (1926) expressed their doubt about the status of this species, considering it is a probable synonym of *melinarthrum*. It is not included in the above keys.

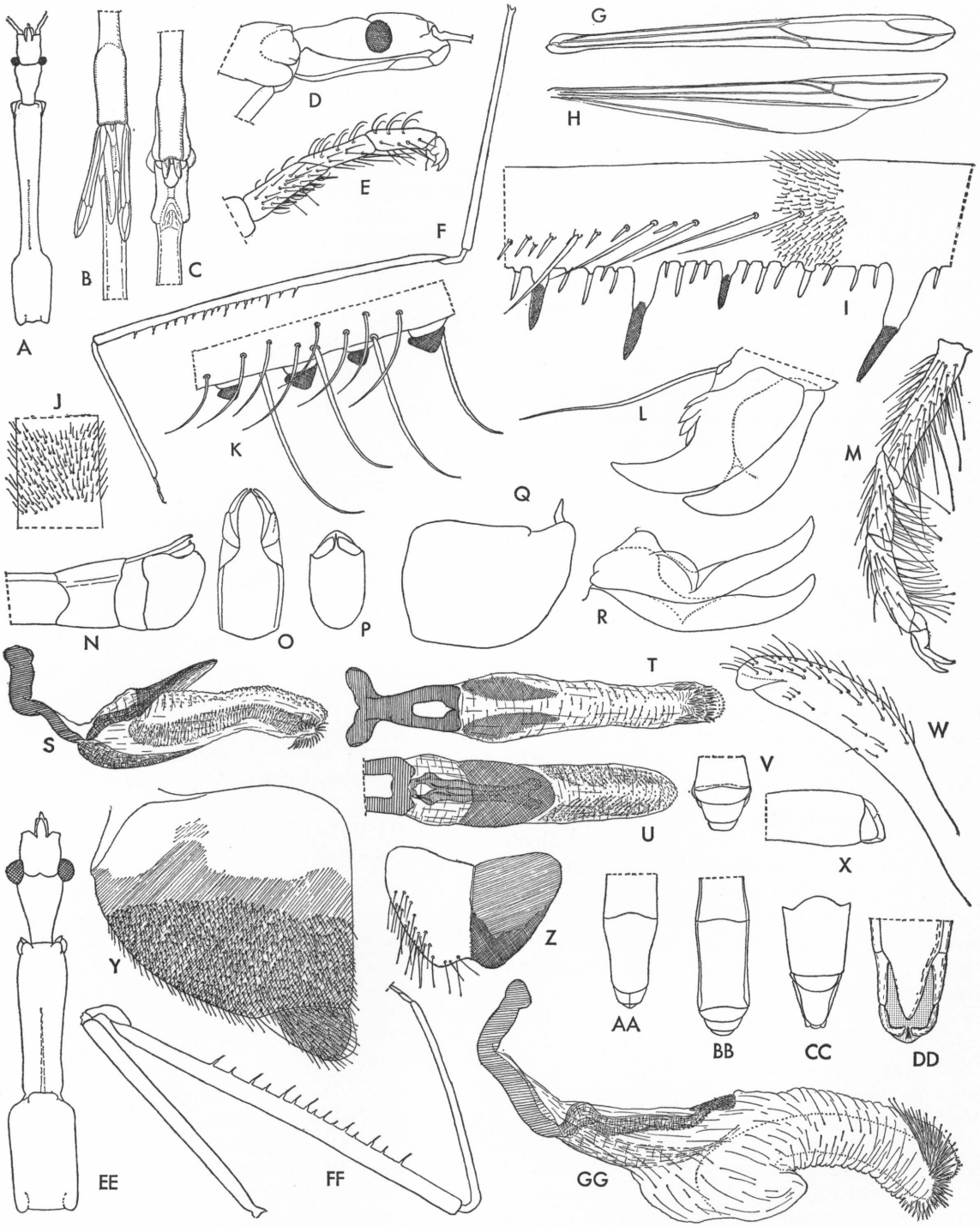
Distribution: Burma; Hainan.
Type: British Museum (Natural History).

Gardena brevicollis Stål

Figure 73CC–GG

Gardena brevicollis Stål, 1871, p. 701.
Gardena australis Horváth, 1902, p. 606.
Gardena fasciata Distant, 1909, p. 505 (new synonymy).
Gardena fusca Fukui, 1926, p. 13, figs. 4, 4a (new synonymy).

Nothing in Distant's (1909) description and figure of his *fasciata* distinguishes it from *brevicollis*. The color pattern of the thorax, as described by Distant, is typical of well-preserved specimens of *brevicollis;* identical considerations hold true for Fukui's *fusca*. The species is quite variable in size; males range from 12.0 to 13.5 mm.; females, from 14.5 to 19.0 mm., in length.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF
GG

Gardena brevicollis was illustrated in detail by Wygodzinsky (1956). A few of these drawings are reproduced here, and an improved drawing of the phallus shows the everted endosoma (fig. 73GG).

MATERIAL EXAMINED: *Formosa:* Takao, 1907 (Sauter; Hungarian National Museum), one male. *Borneo:* Mahakkan, 1894 (Nieuwenhuis; Museum Zoologicum Universitatis), one female. *Java:* Preanger, Soemedang, November 8, 1939 (F. C. Drescher; Museum Zoologicum Bogoriense), one male; Samarang, June, 1910 (Jacobson; Museum Zoologicum Universitatis), one female. *New Ireland:* Gilingil Pl'n [?Plantation], July 4, 1956, light trap, 2 meters (J. L. Gressitt; Bernice P. Bishop Museum), one female. *New Britain:* Linga Linga Pl'n [?Plantation], west of Willaumeza Peninsula, April 13, 1956, light trap, 1 meter (J. L. Gressitt; Bernice P. Bishop Museum), one male. *Solomon Islands:* Bougainville: Buin (Kangu), May 31, 1958, light trap, 1 meter to 50 meters (E. J. Ford, Jr.; Bernice P. Bishop Museum), one male.

DISTRIBUTION: Ceylon; Japan; Formosa; Philippines; Malaya; Sumatra; Borneo; Java; Soemba; Australia (New South Wales); Bismarck Archipelago; Solomon Islands.

TYPES: Of *brevicollis*, female, Museum Zoologicum Universitatis; of *australis*, female, Hungarian National Museum; of *fasciata*, British Museum (Natural History); of *fusca*, Imperial Museum.

Gardena catenaria Wygodzinsky and Usinger

Figure 74T, U, X, Y

Gardena catenarium WYGODZINSKY AND USINGER, 1960, p. 242, figs. 4a–4k.

DISTRIBUTION: Caroline Islands.

TYPE: Male, United States National Museum.

Gardena cheesmanae Wygodzinsky

Figure 74R, W, Z

Gardena cheesmanae WYGODZINSKY, 1958b, p. 333, figs. 8–20.

MATERIAL EXAMINED: Philippines: Leyte: Abugog, July 7, 1961, at light (A. Celestino; the American Museum of Natural History), one male.

DISTRIBUTION: Philippines; New Guinea; New Britain.

TYPE: Male, British Museum (Natural History).

Gardena crispina McAtee and Malloch

Gardena crispina MCATEE AND MALLOCH, 1925, p. 70, figs. 98, 108.

DISTRIBUTION: Costa Rica.

TYPE: Male, United States National Museum.

Gardena denieri Wygodzinsky

Gardena denieri WYGODZINSKY, 1954b, p. 289, figs. 6–9.

MATERIAL EXAMINED: Bolivia: Yungas de Coroico (Fassel; Naturhistorisches Museum, Vienna), one female.

DISTRIBUTION: Bolivia.

TYPE: Female, Museo de La Plata.

Gardena domitia McAtee and Malloch

Figure 77T

Gardena domitia MCATEE AND MALLOCH, 1925, p. 71, figs. 105, 106, 109, 110.

This species is very closely related to *pipara*, from which it can be distinguished, in the male sex only, by the quite differently shaped

---

FIG. 73 (OPPOSITE PAGE). A–Z, AA, BB. *Gardena melinarthrum*. A. Macropterous male, head and thorax from above. B. Brachypterous male, Mt. Makiling, thorax, from above. C. Micropterous female, Los Baños, thorax, seen from above. D. Head, lateral view. E. Fore tarsus. F. Foreleg. G. Forewing. H. Hind wing. I. Base of fore femur. J. Portion of posterior femur. K. Detail of under surface of fore tibia. L. Praetarsus of foreleg, with claws. M. Hind tarsus. N. Apex of abdomen of male, side view. O. Genital region of male, seen from above. P. Pygophore, seen from behind. Q. Pygophore, lateral view. R. Claws of hind legs. S. Phallus, lateral view. T. Phallus, ventral aspect. U. Phallosoma, dorsal aspect. V. Genital region of female, seen from behind. W. Paramere. X. Apex of abdomen of female, side view. Y. Gonocoxite with gonapophysis. Z. Syngonapophysis. AA. Genital region of female, ventral view. BB. Genital region of female, dorsal aspect. CC–GG. *Gardena brevicollis*. CC. Genital region of female, seen from above. DD. Apex of abdomen of male, dorsal view. EE. Head and pronotum, dorsal view. FF. Foreleg. GG. Phallus, lateral view.

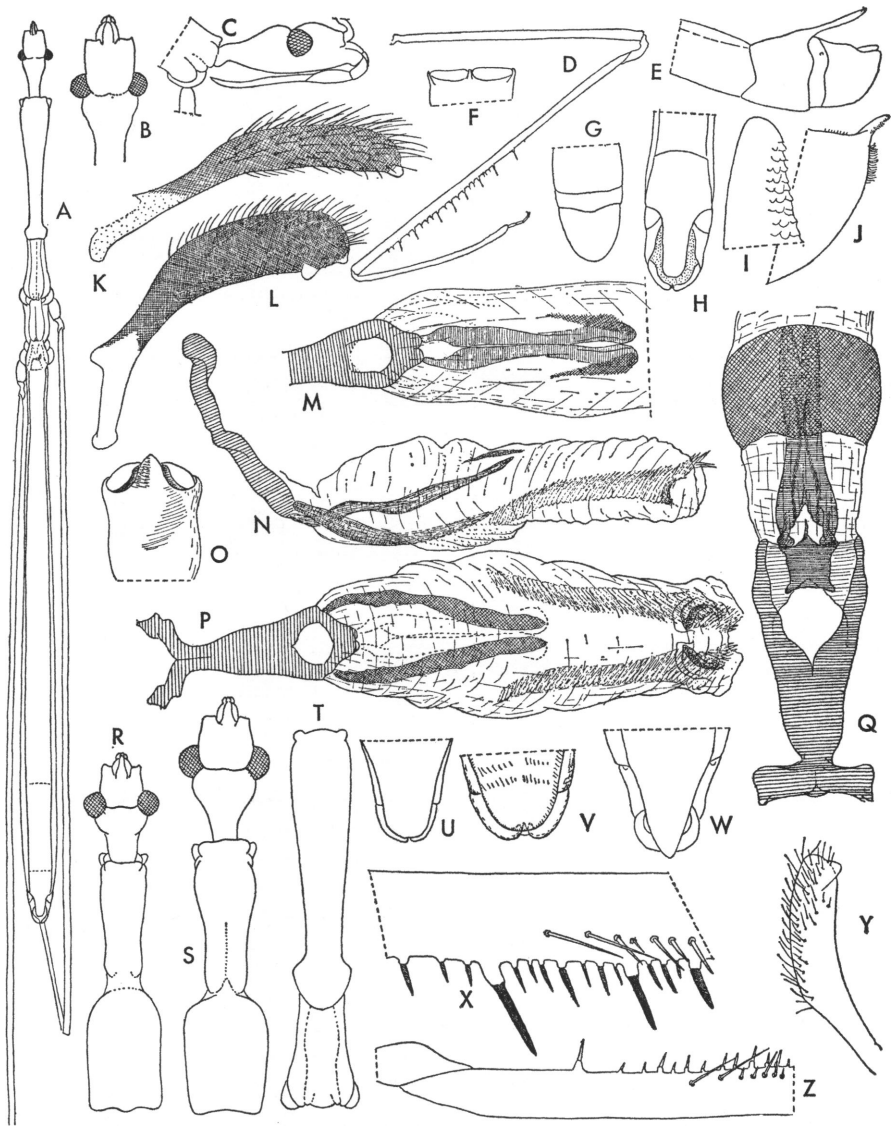


FIG. 74. A–J. *Gardena fuliginosa*, male. A. General aspect. B. Head, dorsal view. C. Head, lateral aspect. D. Foreleg. E. Apex of abdomen, lateral view. F. Apex of pygophore, seen from behind. G. Genital region, seen from below. H. Apex of abdomen, dorsal view. I. Apex of process of pygophore, high magnification. J. Posterior portion of pygophore, lateral view. K. *Gardena hirticornis*, paramere. L. *Gardena fuliginosa*, paramere. M, N. *Gardena muscicapa*. M. Base of phallosoma, seen from above. N. Phallus, lateral view. O. *Gardena* sp., near *leleupi*, male from Umkomaas, pygophore, seen from behind. P. *Gardena muscicapa*, phallus, ventral aspect. Q. *Gardena hirticornis*, articulatory apparatus and basal portion of phallosoma, dorsal view. R. *Gardena cheesmanae*, male, head and prothorax, dorsal view. S. *Gardena muscicapa*, head and prothorax, dorsal view. T, U. *Gardena catenaria*, male. T. Prothorax and mesothorax, dorsal aspect. U. Apex of abdomen, seen from above. V. *Gardena muscicapa*, male, apex of abdomen, dorsal view. W. *Gardena cheesmanae*, male, apex of abdomen, seen from above. X, Y. *Gardena catenaria*. X. Base of series of fore femur. Y. Paramere. Z. *Gardena cheesmanae*, base of fore femur.

paramere (see key and fig. 77K, T); the phalli are completely identical. The females are impossible to distinguish; the key characters given by McAtee and Malloch (1925), viz., the lack of a preapical pale band on the mid and hind femora in *domitia*, do not hold. All specimens of *domitia* that I have examined possess a preapical as well as an apical pale band. The genitalia of females of *domitia* are exactly like those of *pipara* (see fig. 77G). Among the material examined, in the preparation of the present paper and earlier, there is considerable variability, as to body length, relative size of the fore and hind lobe of the pronotum, and coloring, from rather uniformly dark to light-colored as described for *agrippina*. As a matter of fact, it seems possible that the latter species was based on a somewhat aberrant specimen of *pipara*.

MATERIAL EXAMINED: *Brazil:* Amazonas: Lago de Xibarena, Manaos, January 25, 1956 (O. Rappa; the American Museum of Natural History), one male; Amazonas: [locality illegible] May, 1950 (J. C. M. Carvalho; Museu Nacional), one male; Estado do Río: Itaguaí: Kilometer 47, Estrada Río-São Paulo, March 14, 1948 (W. Zikán; Instituto de Ecologia e Experimentação Agrícolas), one male. *Peru:* Pachitea (the California Academy of Sciences), one male.

DISTRIBUTION: Bolivia; Brazil.

TYPE: MALE, the University of Kansas.

Gardena elkinsi, new species

Figure 76A–D, K, L, P, Q

Lutevopsis longimanus MCATEE AND MALLOCH, 1925, p. 37, figs. 43, 44 (*nec* Champion).

Lutevopsis sp. ELKINS, 1951c, p. 408.

This species, dedicated to my friend Joe C. Elkins in acknowledgment of his work on the reduviids, is clearly different from *longimana*, a fact not recognized by McAtee and Malloch (1925), who gave a description of it as *longimana*. The color and some of the structural differences between *elkinsi* and *longimana* are indicated in the keys. Additional characters are to be found in the surface structure of the pronotum, with the fore lobe smooth in *elkinsi* (delicately striate transversely in *longimana*) and the hind lobe polished, only faintly rugose transversely (opaque or subshining and very coarsely and densely rugose in *longimana*). The pterostigma is strongly coriaceous in *longimana*, vertically membranous in *elkinsi*. There is also a certain difference in the shape of the cell of the forewing, though not always so extreme as is shown in figures 75I and 76C. In the hind wing of *elkinsi* Cu is in most cases separated from M by a short but distinct cross vein; this cross vein does not exist in *longimana* or any other species of *Gardena* that has been examined for it.

The genitalia of the female and the pygophore of the male are identical in both species; the parameres of *elkinsi* (fig. 76K) are somewhat more swollen apically than are those of *longimana* (fig. 76G); the differences in the phallus, though not striking, are obvious (fig. 76L–Q).

The male of *elkinsi* measures 9 mm.; the females measure 9.5–10.8 mm. The relative lengths of the antennal segments are 1/0.85/-0.13/0.27.

MATERIAL EXAMINED: *United States:* California: Yolo County: 8 miles northwest of Winters, July 13 and 28, 1959, light trap (J. Fowler; University of California, Davis), two male paratypes; (J. Fowler; the American Museum of Natural History), one male paratype. Arizona: Prescott, August 16, 1939 (F. H. Parker; the University of Kansas), one female allotype; Cochise County: Mule Mountains, Gilman Ranch, 8 miles north of Bisbee, August 11, 1952 (H. B. Leech, J. W. Green; the California Academy of Sciences), one male paratype; Chiricahua Mountains, 5 miles west of Portal, August 1, 1958 (D. D. Linsdale; University of California, Davis), one male paratype. Texas: Weslaco, January, 1940, at light (the American Museum of Natural History), one female paratype; Fort Sam Houston, September 25, 1950 (J. Gentry; the American Museum of Natural History), one female paratype. *Mexico:* Nuevo Leon: Monterrey, October 6, 1945 (the American Museum of Natural History), one male holotype; Morelos: Yautepec, May 4, 1962 (F. D. Parker and L. A. Stange; University of California, Davis), one male.

The female specimens from Harlingen, Texas (Elkins, 1951c), and Istachatta, Florida (McAtee and Malloch, 1925), were examined and both are designated as paratypes.

Gardena eutropia McAtee and Malloch

Gardena eutropia McAtee and Malloch, 1925, p. 71, figs. 99, 111.

Distribution: Brazil (Pará).

Type: Male, Carnegie Museum.

Gardena faustina McAtee and Malloch

Figure 77E, F, I, J, L, M, P, Q, S

Gardena faustina McAtee and Malloch, 1925, p. 78, figs. 102, 103, 115.

The female and part of the male genitalia are illustrated here for comparative purposes.

The Colombian female mentioned below is micropterous, the whitish wing pads not reaching the base of the abdomen; the pronotum is normally developed.

Material Examined: *Nicaragua:* Musawas, upper Waspue River, October 26, 1955 (Malkin; the California Academy of Sciences), one male, one female. *Panama:* Canal Zone: Barro Colorado Island, April 8, 1962 (H. Ruckes; the American Museum of Natural History), one female. *Venezuela:* San Esteban, January, 1940 (P. J. Anduze; the California Academy of Sciences), three males, one female. *Colombia:* West coast, La Guayacana, July 29, 1956, 240 meters (Sturm; the American Museum of Natural History), one female. *British Guiana:* Blairmont, August, 1923 (F. X. Williams; Bernice P. Bishop Museum), one male. *Brazil:* Estado do Río: Paraíba do Sud (J. C. M. Carvalho; Museu Nacional), one male.

Distribution: Costa Rica; Nicaragua; Panama; Colombia; Venezuela; the Guianas; Brazil.

Type: Male, United States National Museum.

Gardena fuliginosa, new species

Figure 74A–J, L

Description: Apterous male: Length, 21.5 mm.; head, 2.0; thorax, 6.2; abdomen, 13.3 mm.

Head, thorax, and abdomen sooty black; postocular region faintly rufescent dorsally between interocular sulcus; 1+1 stramineous spots laterally behind eyes. Rostrum and antennae castaneous. Coxa of forelegs fuscous, piceous toward apex, same as trochanter; femur, tibia, and tarsus castaneous. Coxae of mid and hind legs black, remaining segments castaneous, tibia rather light-colored; apex of femora and base of tibiae each with a wide, uninterrupted, ivory-colored annulus. Head, thorax, connexivum, and appendages shining, rest of abdomen dull. Head and body very shortly pilose.

Shape of head as illustrated in figure 74A, B; sides of postocular region gradually convergent posteriorly. Eyes small; their distance dorsally about twice their width. Rostrum as shown in figure 74C, second segment attaining level of center of eyes. First and second segments of antennae with numerous hairs about three times as long as diameter of segment. Length of first segment, 15.5 mm.; of second, 14 mm.

Thorax as shown in figure 74A. Pronotum about five times as long as maximum width, lacking dorsal longitudinal sulcus; hind lobe very coarsely rugose transversely. Mesonotum strongly convex on posterior half, sulcate along middle; metanotum carinate along middle longitudinally, somewhat more than half as long as mesonotum, combined seven-tenths as long as pronotum.

Forelegs long and slender (fig. 74D). Femur about 45 times as long as wide; basal two-fifths and apical sixth devoid of spines; posteroventral series composed of eight large and 15 medium-sized spines; former, combined with their bases, slightly longer than diameter of segment. Tibia slightly shorter than half of length of femur, with about 70 beak-shaped to peg-shaped denticles. Fore tarsus and claws like those of *melinarthrum* (see fig. 73E, L). Length of median femora, 18 mm.; of hind femora, 23 mm.

Abdomen slender, elongate (fig. 74A), dorsal intersegmental sutures not distinct, with exception of posterior ones. Last tergite tongue-shaped, rather abruptly truncate apically, rather narrow, its sides parallel (fig. 74H). Seventh and eighth sternites as shown in figure 74E, G. Pygophore somewhat compressed laterally, its shape as shown in figure 74E, H, J. Posterior process short, spinelike, rounded apically, its posterior border with scalelike sculpture (fig. 74I). Parameres somewhat curved, their chaetotaxy and pigmentation as shown in figure 74L. Phallus very similar to that of *hirticornis* (see fig. 74Q).

Material Examined: Cameroon: Ebo-

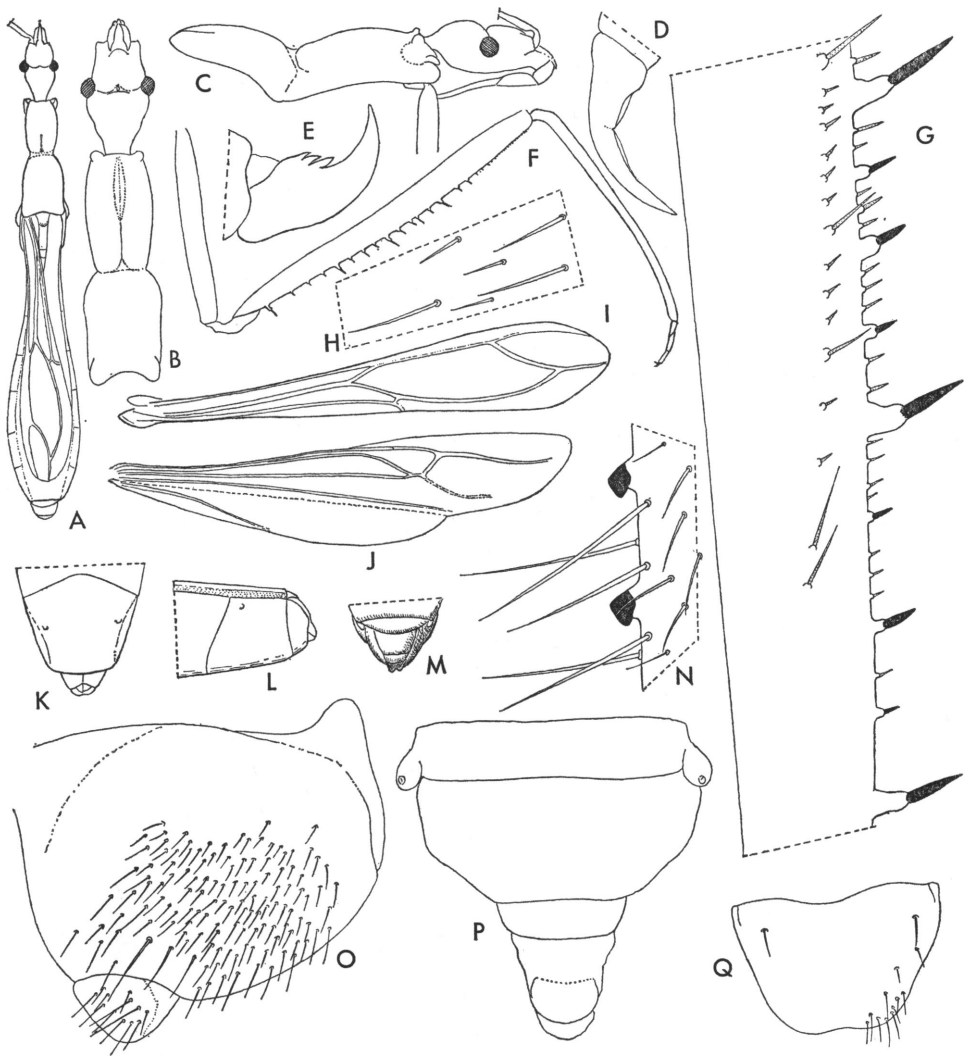


FIG. 75. *Gardena longimana*. A. Female, general aspect. B. Male, head and thorax, seen from above. C. Head and prothorax of female, lateral view. D. Claw of hind leg. E. Outer claw of foreleg. F. Foreleg. G. Base of fore femur. H. Setae of posterior femur. I. Forewing. J. Hind wing. K. Apex of abdomen of female, ventral aspect. L. Apex of abdomen of female, lateral view. M. Genital region of female, seen from behind. N. Portion of under surface of fore tibia. O. Gonocoxite with gonapophysis. P. Posterior tergites, as seen on slide mount. Q. Syngonapophysis.

lewo, November 1, 1935 (Carnegie Museum), one male holotype.

OBSERVATIONS: *Gardena fuliginosa* is the third apterous Ethiopian species of *Gardena*. It differs from *viettei*, also known only from the apterous male, by the characters given in the key, the shorter posterior process of the pygophore, and the less widely exposed seventh sternite, and from *sjostedti* by its concolorous sooty black abdomen.

Gardena gabonensis Villiers

Gardena gabonensis VILLIERS, 1948, p. 439, figs. 845, 851, 852.

DISTRIBUTION: Gabon.

TYPE: Male, Muséum National d'Histoire Naturelle.

Gardena garambana Villiers

Gardena garambana VILLIERS, 1964, p. 126, figs. 54, 55.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Male, Institut des Parques Nationaux du Congo et du Rwanda.

Gardena geniculata China

Gardena geniculata CHINA, 1930, p. 143, figs. 23a–23c.

The specimens examined in the preparation of this paper agree reasonably well with the original description, which was based on a female, though they lack a white annulus at the base of the fore tibia; they are also apterous. The fore tarsi are three-segmented, as are those of all other species of *Gardena*. The two-segmented condition shown in China's figure 23c is possibly due to an error of observation.

The posterosuperior process of the pygophore is spinelike, the parameres are similar to those of *catenaria* (see fig. 74Y), and the phallus is like that of *muscicapa* (see fig. 74M, N, P).

MATERIAL EXAMINED: Samoa: Upolu: Mafa Pass Road, February, 1955 (N. L. H. Krauss; Bernice P. Bishop Museum), one male; (N. L. H. Krauss; the American Museum of Natural History), one male.

DISTRIBUTION: Samoa.

TYPE: Female, British Museum (Natural History).

Gardena globuliceps Villiers

Gardena globuliceps VILLIERS, 1948, p. 438, figs. 838–840, 850.

This is a small species (15 mm.), with the posterosuperior process of the pygophore very short and broad, emarginate apically, not unlike that of *longimana* (see fig. 76I). The species may well belong to the *brevicollis* group.

DISTRIBUTION: Fernando Poo.

TYPE: Male, Muséum National d'Histoire Naturelle.

Gardena hirticornis Villiers

Figure 74K, Q

Gardena hirticornis VILLIERS, 1948, p. 438, figs. 841–844, 854.

The posterior process of the pygophore is spinelike. A paramere and the basal portion of the phallus are figured here; the close relationship to *melinarthrum* is obvious.

MATERIAL EXAMINED: Cameroon, September, 1913 (A. I. Good; Carnegie Museum), one male.

DISTRIBUTION: Cameroon; Congo (Léopoldville); Angola.

TYPE: Male, Muséum National d'Histoire Naturelle.

Gardena insignis Horváth

Gardena insignis HORVÁTH, 1887, p. 71.

A partly illustrated redescription was given by Dispons and Stichel (1959), and various figures were published by Ribes (1961) and by Tamanini (1962).

DISTRIBUTION: Spain; Italy; Yugoslavia; Israel.

TYPE: Unknown.

Gardena kivuensis Villiers

Gardena kivuensis VILLIERS, 1958, p. 277, figs. 1–3.

This species seems very closely related to *muscicapa*, which has been collected as far north as Uganda (see below). The only difference to be found in the description of *kivuensis* is the lack of a longitudinal furrow on the anterior lobe of pronotum.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Female, Musée Royal de l'Afrique Centrale.

Gardena lamottei Villiers

Gardena lamottei VILLIERS, 1948, p. 439, figs. 846–849, 853.

DISTRIBUTION: Ivory Coast; Guinea.

TYPE: Female, Muséum National d'Histoire Naturelle.

Gardena leleupi Villiers

Gardena leleupi VILLIERS, 1958, p. 279, figs. 4–6.

This species was described from a female. I have examined two males, one from the Congo (Léopoldville): Masisi, Kivu (Rijksmuseum van Natuurlijke Historie); and one from Transvaal: Umkomaas, January, 1914, A. J. T. Janse (Hungarian National Museum), which are very similar to but probably not identical with *leleupi*. Their pygophores have a posterior, scoop-shaped, apically pointed, somewhat concave projection (fig.

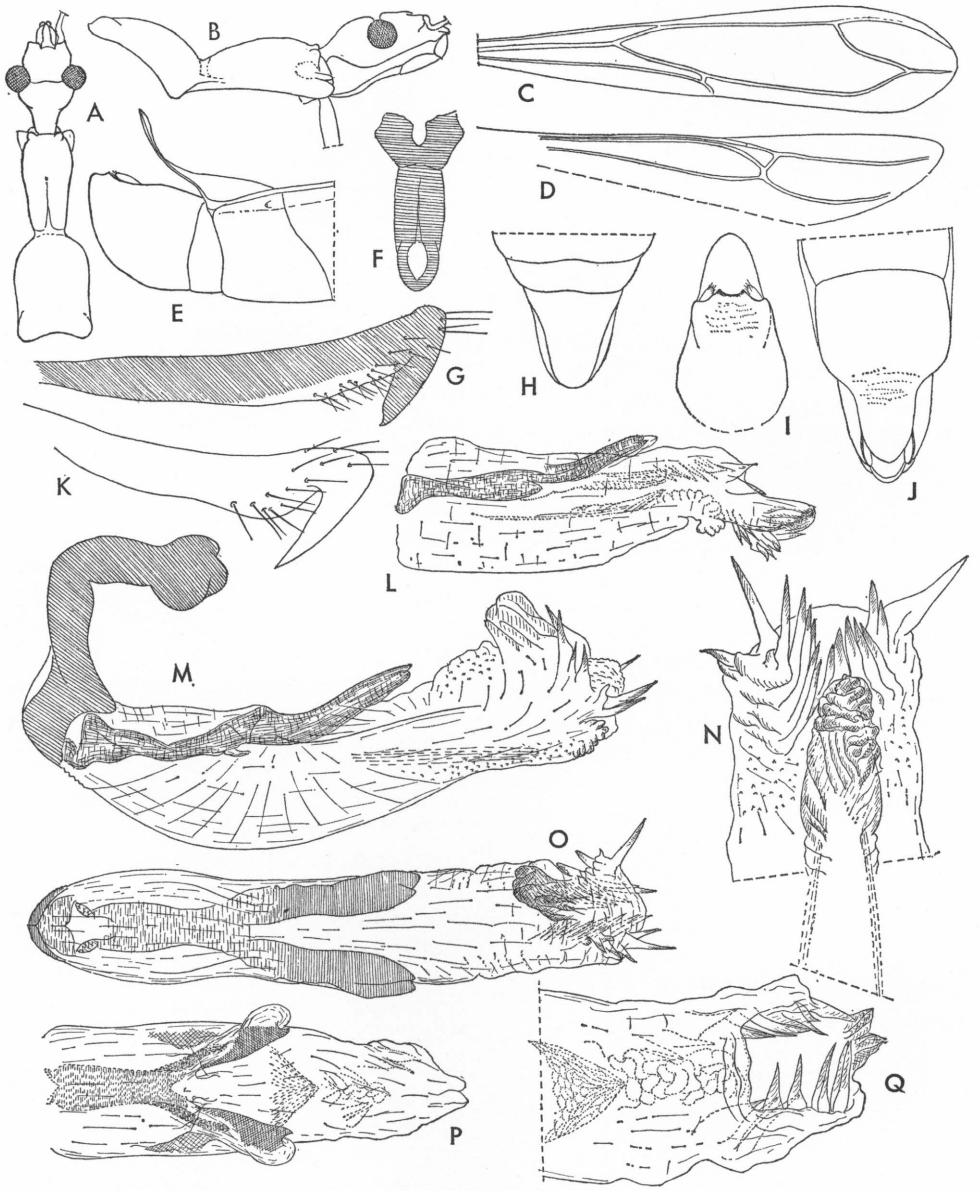


FIG. 76. A–D. *Gardena elkinsi*. A. Head and prothorax of male, dorsal view. B. Head and prothorax of female, lateral aspect. C. Forewing. D. Hind wing. E–J. *Gardena longimana*, male. E. Apex of abdomen, lateral view. F. Articulatory apparatus. G. Paramere, pigmentation shown. H. Genital region, ventral aspect. I. Pygophore, seen from behind. J. Genital region, dorsal view. K, L. *Gardena elkinsi*. K. Paramere. L. Phallosoma, lateral view. M–O. *Gardena longimana*. M. Phallus, lateral view. N. Distal portion of phallosoma, ventral aspect. O. Phallosoma, dorsal view. P, Q. *Gardena elkinsi*. P. Phallosoma, dorsal view. Q. Apex of phallosoma, ventral aspect.

74 O); the phallus agrees completely with that of the *brevicollis* group, in which *leleupi* has consequently been placed.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Female, Musée Royal de l'Afrique Centrale.

Gardena longimana (Champion), new combination

Figures 75A–Q; 76E-J, M–O

Lutevopsis longimanus CHAMPION, 1898a, p. 166, pl. 10, figs. 10, 10a.

Champion's description is here supplemented with drawings of the more important morphological features. The male seen by Champion was 9.9 mm. long; the male examined by me is somewhat larger (10.6 mm.). The females are, respectively, 10 and 11 mm. long. As to color, the male agrees well with the original description. In the females, the fore lobe of the pronotum is almost completely piceous, with only the collar and adjacent regions ferruginous.

Morphologically, the female is very much like the male, though the first segment of the antennae lacks long hairs, and the abdomen is somewhat wider (fig. 75A); the wings are not shorter than those of the male. The female genitalia are shown in figure 75K–M, O–Q.

MATERIAL EXAMINED: Mexico: Chihuahua: Salaices, July 23, 1947 (Gertsch, D. Rockefeller Expedition; the American Museum of Natural History), one male, one female allotype compared by Dr. R. J. Izzard with the type of the species; Distrito Federal: (the American Museum of Natural History), one male.

DISTRIBUTION: Mexico.

TYPE: Male, British Museum (Natural History).

Gardena longipes Villiers

Gardena longipes VILLIERS, 1949a, p. 292.

To judge from the shape of the process of the pygophore, this species may belong to the *brevicollis* group.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Male, Musée Royal de l'Afrique Centrale.

Gardena marcia McAtee and Malloch

Gardena marcia MCATEE AND MALLOCH, 1925, p. 72, figs. 100, 112.

DISTRIBUTION: Brazil (Pará); Trinidad.

TYPE: Male, Carnegie Museum.

Gardena melinarthrum Dohrn

Figure 73A–Z, AA, BB

Gardena melinoarthrum (*sic*) DOHRN, 1859, p. 52 (*nomen nudum*).

Gardena melinarthrum DOHRN, 1860, p. 214.

Gardena melinarthrum var. *femoralis* MCATEE AND MALLOCH, 1925, p. 136.

Gardena semperi DOHRN, 1863, p. 64.

The species was described originally from an apterous specimen collected on Ceylon. McAtee and Malloch synonymized the Philippine *semperi*, known from the winged form only, with *melinarthrum*. McAtee and Malloch's color variety, *femoralis*, has no taxonomic status.

As this species is the type species of the genus, and as no modern redescription is available, the main morphological features of *melinarthrum* are illustrated here. The drawings are self-explanatory. Attention is drawn to the progressive narrowing of the posterior lobe of the pronotum correlated with the degree of abbreviation of the wings (figs. 73A–C). Apterous specimens were not examined.

MATERIAL EXAMINED: *Formosa:* Heito, 1934 (L. Gressitt; the University of Kansas), one female. *Philippines:* Mt. Makiling (Baker; United States National Museum), one female; (Baker; the American Museum of Natural History), one male; Mt. Makiling, October, 1945, 2500 feet (Malkin; United States National Museum), one male; Luzon: "Pf." Rizal, Montalban (W. Schulze; Naturhistorisches Museum, Basel), one female; Los Baños (F. X. Williams; Bernice P. Bishop Museum), one male, two females; Mindoro: San José (Ross and Skinner; the California Academy of Sciences), two males, two females; (Ross and Skinner; the American Museum of Natural History), one female; Mindoro: Subaan (Zoölogisch Museum), one male; Davao (the American Museum of Natural History), one female; Samar: (the American Museum of Natural History), two males; Sulu: Tawitawi, Tarakan, farm district, February 11, 1957 (Y. Kondo; Bernice P. Bishop Museum), one specimen. *Sumatra:* Aur Kumanis, March, 1941 (Edw. Jacobson; Rijksmuseum van Natuurlijke Historie), one

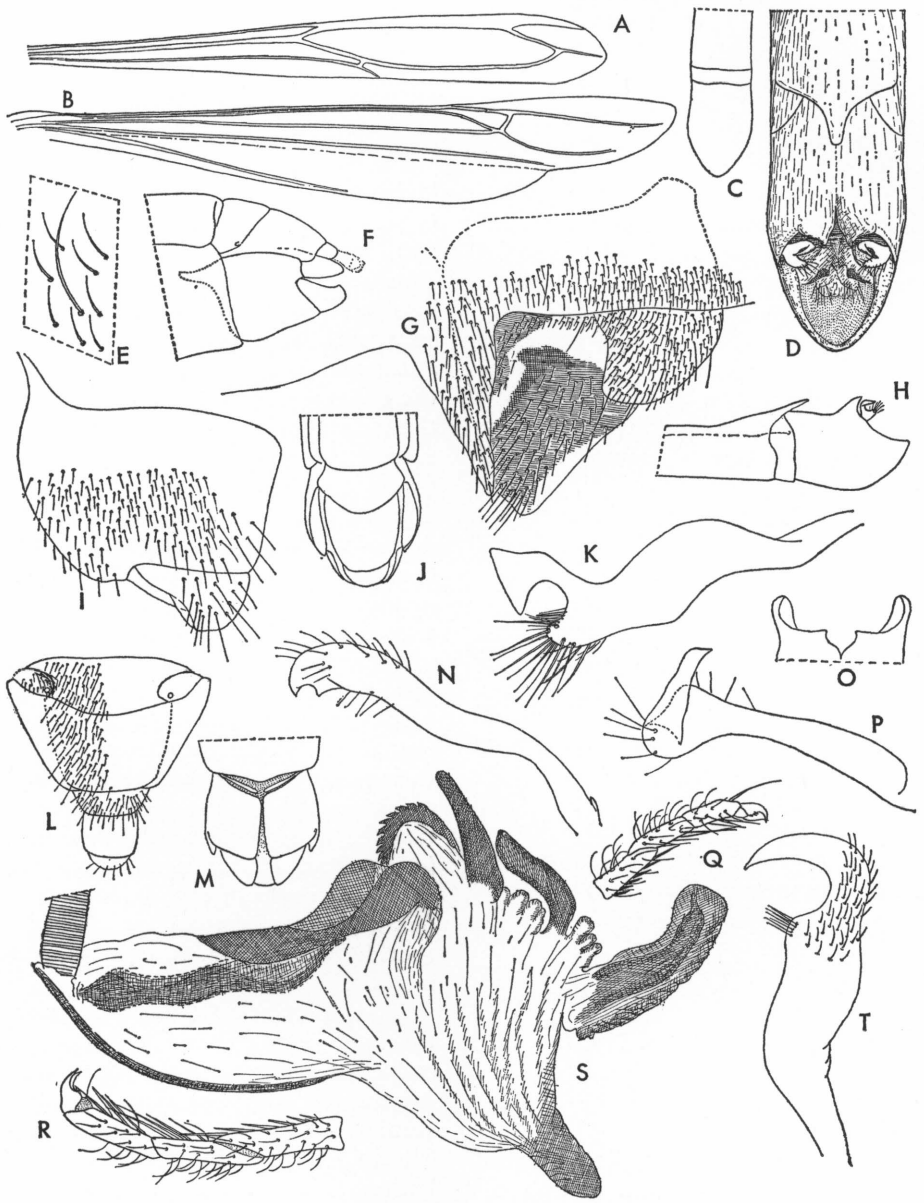


FIG. 77. A–D. *Gardena pipara*, male. A. Forewing. B. Hind wing. C. Apex of abdomen, ventral view. D. Genital region, dorsal aspect. E, F. *Gardena faustina*, female. E. Setae of fifth sternite. F. Genital region, lateral view. G, H. *Gardena pipara*. G. Center of hind border of seventh sternite of female, with gonocoxite and gonapophysis. H. Apex of abdomen of male, lateral view. I, J. *Gardena faustina*, female. I. Gonocoxite and gonapophysis. J. Genital region, dorsal aspect. K. *Gardena pipara*, paramere. L, M. *Gardena faustina*, female. L. Posterior tergites, as seen on slide mounts. M. Genital region, ventral view. N, O. *Gardena americana*, male. N. Paramere. O. Apex of pygophore, seen from behind. P, Q. *Gardena faustina*. P. Paramere. Q. Tarsus of foreleg. R. *Gardena pipara*, tarsus of hind leg. S. *Gardena faustina*, phallosoma, lateral view. T. *Gardena domitia*, paramere.

male; West Sumatra: Loebeo Bangkoe, 1905 (G. Menzel; Rijksmuseum van Natuurlijke Historie), one female. *Java:* West Java: Goenong Patat (M. E. Walsh; Naturhistorisches Museum Basel), one male; West Java: Mt. Gede-Pangerango, Tjibodas, October, 1948, 1400 meters (A. M. Neervor; Museum Zoologicum Bogoriense), one female. *Sumba:* Mau Marru, July 20, 1949 (Expedition Bühler-Sutter; Naturhistorisches Museum Basel), one specimen; Prai Jawang, Rende Wai, June 11, 1949 (Expedition Bühler-Sutter; Naturhistorisches Museum Basel), one female; central Sumba: Langgaliru, October 10, 1949 (Expedition Bühler-Sutter; Naturhistorisches Museum Basel), one female; west Sumba: Bondo Kodi, July 2, 1949 (Expedition Bühler-Sutter; Naturhistorisches Museum Basel), one female. *Lombok:* Sapit, May–June, 1896, 2000 feet (H. Frühstorfer; Naturhistorisches Museum, Vienna), one female; (H. Frühstorfer; Hungarian National Museum), one male, one female. *Australia:* (J. Dammer; Hungarian National Museum), one male.

DISTRIBUTION: Oriental and Australian regions, from Ceylon to Formosa and Australia.

TYPES: Unknown.

Gardena muscicapa (Bergroth)

Figure 74M, N, P, S, V

Lutevopsis muscicapa BERGROTH, 1906a, p. 311.

Gardena muscicapa: WYGODZINSKY, 1958b, p. 335.

Gardena polita MILLER, 1941, p. 779, figs. 4a, 4b (new synonymy).

Gardena chinai WYGODZINSKY, 1952c, p. 155, figs. 15–29 (new synonymy).

This species is one of the smallest of the genus; the males are 9.5–11 mm. in length, the females, 10–11 mm. It is interesting to speculate about the fact that this, being one of the smallest species of *Gardena*, is also the one with the widest distribution, being actually found in three zoogeographical regions.

There is some variability in the degree of inclination of the hind lobe of the pronotum; it is least elevated, as compared to the fore lobe, in Japanese specimens.

The pygophore of the male possesses a posterior, spinelike projection (fig. 74V). The parameres are slightly clavate, curved and somewhat pointed apically. The phallus, the structure of which places *muscicapa* in the *brevicollis* group, is illustrated in figure 74M, N, P. There is a small, oval, platelike sclerite on each side of the secondary gonopore.

I have seen a specimen belonging to the Helsinki Museum which may well be the type. It bears the following label: "Borneo/ 620/ Lutevopsis muscicapa det Berg Berg." This specimen is poorly preserved, with all legs lacking with the exception of one fore coxa, and there are only three segments of one antennae. The insect agrees very well with the original description, with the exception of the relative length of the abdominal segments. However, the limits between the (apparent) first and second segments are difficult to observe, and a strong fold on the disc of the second segment may be taken for the borderline between the two basal segments. The actual relative lengths of the segments are as follows: 55/75/75/65/50/35, viz., the second segment is not shorter than the first.

Miller's *polita* is here synonymized with *muscicapa*, as the description and figures fail to indicate any characters that would distinguish *polita* from *muscicapa*. The same holds true for *chinai*, which was considered to differ from *muscicapa* on account of the different relative lengths of the abdominal sternites; it has now been shown (see above) that Bergroth's description was erroneous in this respect.

MATERIAL EXAMINED: *Japan:* Kyushu: Fukuoka, September 9, 1956 (M. Miyamoto; collection Miyamoto), one female; (M. Miyamoto; the American Museum of Natural History), one female. *Philippines:* Manila, August 29, 1930 (R. C. McGregor; United States National Museum), one male. *Borneo:* (Museum Zoologicum Universitatis), one specimen, type? *Sumatra:* Fort de Kock, January, 1914 (E. Jacobson; Zoölogisch Museum), one male; Tandjong Morawa, Serdang, at light (H. L. Naezer; the American Museum of Natural History), four males. *New Guinea:* North-East New Guinea: Lambaeb, Salawaket Range, September 16–19, 1956, 900 meters (R. J. Ford, Jr.; Bernice P. Bishop Museum), one male. *Uganda:* Kampala, July 20, 1932 [H. Hargreaves; British Museum (Natural History)], one female.

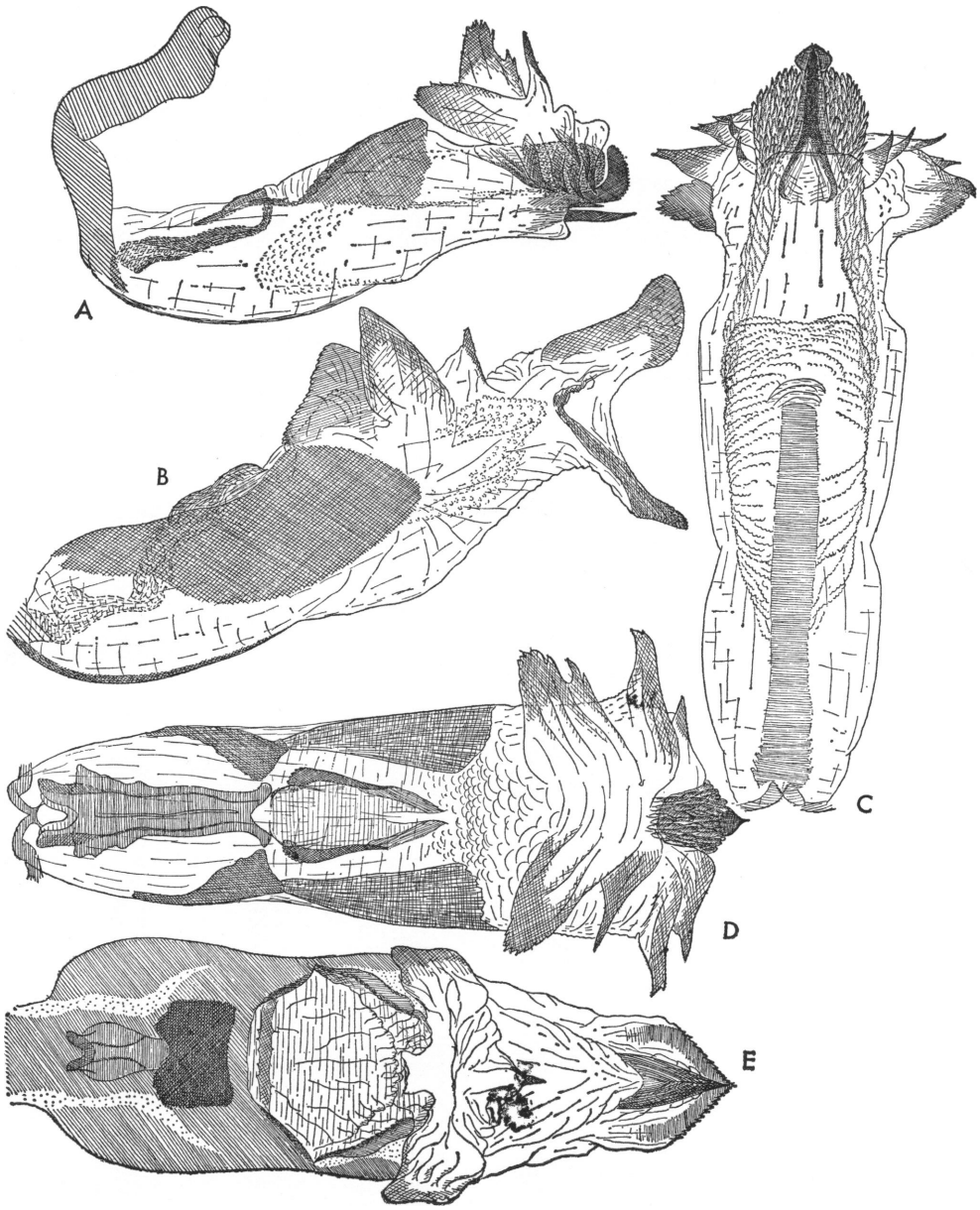


FIG. 78. A. *Gardena pipara*, phallus, lateral aspect. B. *Gardena americana*, phallosoma, lateral view. C, D. *Gardena pipara*. C. Phallosoma, ventral aspect. D. Phallosoma, dorsal view. E. *Gardena americana*, phallosoma, dorsal aspect.

DISTRIBUTION: Japan; Philippines; Malaya; Borneo; Sumatra; New Guinea; South and east Africa.

TYPES: Of *muscicapa*, male, Museum Zoologicum Universitatis; of *chinai*, male, British Museum (Natural History); of *polita*, unknown.

Gardena orientalis Villiers

Gardena orientalis VILLIERS, 1949a, p. 291, figs. 72, 78.

The shape of the process of the pygophore, not unlike that of the specimen related to *leleupi* (see fig. 74 O), would seem to place this species in the *brevicollis* group.

DISTRIBUTION: Mozambique; Ruanda; Congo (Léopoldville).

TYPE: Male, Muséum National d'Histoire Naturelle.

Gardena pacifica Kirkaldy

Gardena pacifica KIRKALDY, 1908b, p. 371, figs. 3, 3a.

DISTRIBUTION: Fiji; Samoa.

TYPE: Female, Bernice P. Bishop Museum.

Gardena pipara McAtee and Malloch

Figures 3G; 4D, E; 77A–D, G, H, K, R; 78A, C, D

Gardena pipara MCATEE AND MALLOCH, 1925, p. 72, fig. 101.

The wings and genitalia of both sexes are illustrated in detail in the present paper.

MATERIAL EXAMINED: *Brazil:* Pará: Cachimbo, September-October, 1956 (Travassos, Oliveira, and Adão; the American Museum of Natural History), one male; Mato Grosso: Tapirapés, Araguaya (J. M. C. Carvalho; Museu Nacional), one male; Mato Grosso: Cuyabá (Hungarian National Museum), one female. *Paraguay:* S. Lorenzo, May–June, 1905 (Vezényi; Hungarian National Museum), one female.

DISTRIBUTION: Brazil: Bolivia; Paraguay; Argentina.

TYPE: Male, Carnegie Museum.

Gardena poppaea McAtee and Malloch

Gardena poppaea MCATEE AND MALLOCH, 1925, p. 74, figs. 104, 114.

Gardena messalina MCATEE AND MALLOCH, 1925, p. 72. fig. 107.

Elkins (1953) has shown that *messalina* is the female of *poppaea*. This seems to be the only species of the *pipara* group found in the United States.

The posterior portion of the fore lobe of the pronotum of the male may be sulcate or not; it thus has become necessary to place this species in two different couplets in the key.

MATERIAL EXAMINED: *United States:* Texas: Brownsville, at light (E. S. Ross; the California Academy of Sciences), one male. *Mexico:* San Luis Potosí; Tamazunchale, May 20, 1952 (Cazier, Gertsch, and Schrammel; the American Museum of Natural History), one male; Nuevo Leon: Monterrey, May 23, 1952 (Cazier, Gertsch, and Schrammel; the American Museum of Natural History), two males; Tamaulipas: crest of first ridge west of Antigua Morelos, November 18, 1948 (H. B. Leech; the California Academy of Sciences), one male.

DISTRIBUTION: United States (Texas, Florida); Mexico.

TYPES: Of *poppaea*, male, United States National Museum; of *messalina*, female, United States National Museum.

Gardena pyrallis McAtee and Malloch

Gardena pyrallis MCATEE AND MALLOCH, 1925, p. 73.

DISTRIBUTION: Venezuela.

TYPE: Male, Muséum National d'Histoire Naturelle.

Gardena seychellensis Distant

Gardena seychellensis DISTANT, 1913, p. 165, pl. 12, fig. 5.

Bergroth (1915) considered that this species was based on a nymph; it has therefore not been included in the key. A re-examination of authentic material is necessary before the true status of the species can be elucidated.

DISTRIBUTION: Seychelles.

TYPE: British Museum (Natural History).

Gardena sjostedti Haglund

Gardena sjöstedti HAGLUND, 1895, p. 476.

I have seen a female of this species which had been known from its original description only; it seems closely related to *fuliginosa*, described above. The main differences of *sjostedti*, in addition to those connected with the sex of the specimens examined, are the larger size (26–27 mm.), the mainly piceous condition of the antennae, and the distinctly darkened fore coxae basally and apically.

MATERIAL EXAMINED: Cameroon: Matute, Tiko Pl. [?Plantation], May 1, 1949 (B. Malkin; the California Academy of Sciences), one female.

DISTRIBUTION: Cameroon.

TYPE: Female, Naturhistoriska Riksmuseet.

Gardena strangulata Villiers

Gardena strangulata VILLIERS, 1959, p. 344.

From the description alone this species

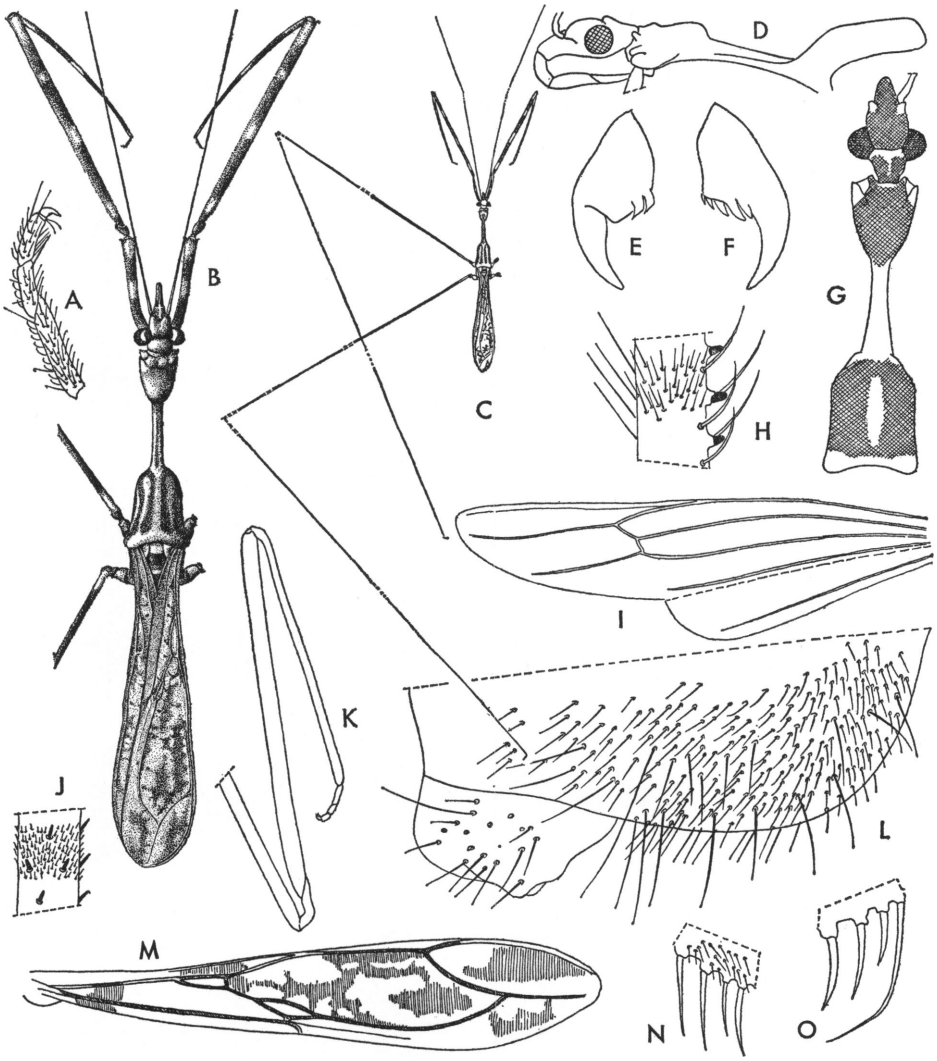


FIG. 79. A–C. *Mayemesa paraensis*, female. A. Fore tarsus. B. General aspect, with color pattern; mid and hind legs not shown. C. General aspect, with mid and hind legs. D–G. *Mayemesa willineri*, female. D. Head and prothorax, lateral view. E, F. Claws of foreleg. G. Head and prothorax, dorsal view, with color pattern. H–L. *Mayemesa paraensis*, female. H. Portion of fore tibia. I. Hind wing. J. Portion of posterior femur. K. Outlines of foreleg. L. Gonocoxite with gonapophysis. M. *Mayemesa willineri*, forewing with color pattern. N, O. *Mayemesa paraensis*. N. Spines of posteroventral series of fore femur. O. Spines of anteroventral series of fore femur.

cannot be placed in any of the established groups.

DISTRIBUTION: Ivory Coast.

TYPE: Male, Muséum National d'Histoire Naturelle.

Gardena tuberculata Villiers

Gardena tuberculata VILLIERS, 1949a, p. 294.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Female, Musée Royal de l'Afrique Centrale.

Gardena viettei Villiers

Gardena viettei VILLIERS, 1957a, p. 54, figs. 1–5.

This is one of the three apterous species from Africa. It was collected in the cloud

forest on Sáo Tomé, at an altitude of 1500 meters.

DISTRIBUTION: São Tomé.

TYPE: Male, Museum National d'Histoire Naturelle.

Gardena sp.

The specimen here listed is a female, possibly of the *brevicollis* group, but does not seem to belong to any named species. Its characters are not striking enough to warrant description at this time, but it is listed here because it represents the only record of *Gardena* for Madagascar.

MATERIAL EXAMINED: Madagascar: Analamasotra, near Périnet (Olsufiev; Zoological Institute of the Academy of Sciences, Leningrad), one female.

MAYEMESA Wygodzinsky

Mayemesa WYGODZINSKY, 1945a, p. 540.

DESCRIPTION: Macropterous female: Medium-sized species (18–20 mm.).

Body slender, appendages very long and delicate. Body surface smooth; pubescence short, inconspicuous; abdominal sternites with microchaetae and macrochaetae; femora of mid and hind legs with short setae and spines. Body and appendages with conspicuous pattern.

Head fusiform, anteocular narrowed toward apex, distinctly longer than postocular portion, latter with sides gradually converging posteriorly in dorsal view. Eyes medium-sized; interocular furrow almost straight across, situated somewhat behind level of center of eyes. Rostrum conspicuously bent between first and second segments; first shortest, second slightly, third distinctly, longer than first; segments not swollen. Antennae inserted about halfway between anterior border of eyes and apex of head.

Pronotum completely covering mesonotum, pedunculate; fore lobe semi-oval; petiole at least as long as fore lobe, slender; hind lobe bell-shaped, lacking any processes. Scutellum triangularly elevated at middle, metanotum simple; both lacking spines.

Forelegs slender, articles parallel-sided; anteroventral and posteroventral series composed of very slender spines and spinelike setae inserted on short, wartlike bases; posteroventral series beginning at base of femur; anteroventral series beginning at second fourth of article, not interrupted at base. Tibia about two-thirds as long as femur, slender, ventrally with one series of short, apically truncate, toothlike spines. Tarsus less than one-sixth of length of tibia, three-segmented, weakly sclerotized, hairy on all surfaces; first segment about as long as second and third together, the last two subequal in size. Claws subequal in size, outer one with four to five subbasal processes, inner one with a submedian incision basad of which there are two small processes. Mid and hind legs very long and slender, mid and hind femur considerably surpassing apex of abdomen. Femora with microchaetae and numerous short spines distributed over whole surface. Tarsi and claws not examined.

Apex of forewings not emarginated; discal, subbasal, and basal cells present, last distinctly separated from subbasal cell, situated on inner border of discal cell somewhat apicad of its base. Single, basad-directed vein emitted from base of subbasal cell, attaining axillary region. Pterostigma carried almost to wing tip. Hind wing with hamus almost straight, running directly to axillary region, maintaining considerable distance from Sc+R. R+M and Cu extending from level of cross vein to border of wing, simple, not joining.

Abdomen slender, its sides subparallel. Sternites with microchaetae and numerous conspicuous macrochaetae. Eighth and ninth tergites weakly chitinized. Gonocoxites slightly wider than long; gonapophyses short. Syngonapophysis triangularly salient at middle behind, with microchaetae and macrochaetae.

TYPE SPECIES: *Mayemesa paraensis* Wygodzinsky (monobasic).

DISTRIBUTION: South America. The discontinuous area of *Mayemesa* (Amazonian Region and Paraguay) is probably a reflection only of insufficient collecting and not of real distributional facts.

KEY TO THE SPECIES OF *Mayemesa*

Petiole longer than fore lobe of pronotum (fig. 79B); hind lobe of pronotum yellowish, with four longitudinal dark stripes (fig. 79B); subbasal cell of forewings much larger than basal cell (fig. 79B) . . . . . *paraensis*

Petiole of pronotum not longer than fore lobe (fig. 79G); hind lobe of pronotum dark, its pos-

terior border and a median longitudinal line yellowish (fig. 79G); basal and intermediate cells of forewings subequal in size (fig. 79M) . . . . . *willineri*

Mayemesa paraensis Wygodzinsky

Figure 79A–C, H—L, N, O

Mayemesa paraensis WYGODZINSKY, 1945a, p. 540, figs. 1–27.

Some of the figures accompanying the original description are presented here.

DISTRIBUTION: Brazil (Pará); Peru.

TYPE: Female, Museu Nacional.

Mayemesa willineri Wygodzinsky

Figure 79D–G, M

Mayemesa willineri WYGODZINSKY, 1950b, p. 77, figs. 18–22.

The main differential characters of the species are illustrated.

DISTRIBUTION: Paraguay.

TYPE: Female, Instituto Sánchez Labrador.

MYIOPHANES REUTER

Myiophanes REUTER, 1881, p. 69.

DESCRIPTION: Macropterous or micropterous. Medium-sized to large species (13–23 mm.).

Macropterous form: Body surface dull to subshining (in no case highly polished); body surface and appendages with numerous short and generally rather dense, long hairs; even microchaetae very long and slender. Body light-colored, body and appendages with or without more or less conspicuous, dark pattern elements.

Head fusiform, anteocular as long as postocular portion, both elevated above. Sides of postocular region distinctly converging toward neck in dorsal and lateral view; anteocular region strongly narrowed anteriorly. Eyes medium-sized to large. Interocular furrow situated near hind border of eyes, attaining or slightly surpassing level of same posteriorly. Rostrum very strongly bent between first and second segments; both segments stout, second in some cases slightly swollen, first and third subequal in length, second slightly shorter. Antennae inserted halfway between anterior border of eyes and apex of head, or somewhat nearer to eyes than to apex.

Pronotum completely convering mesonotum, strongly constricted or pedunculate. Fore lobe inverted cone-shaped, wide anteriorly and considerably narrowed posteriorly; pedunculate portion, when present, continuous with fore lobe and conspicuously detached from hind lobe; latter from subrectangular to bell-shaped, lacking discal or humeral projections or spines. Scutellum and metanotum simple, lacking processes or spines.

Forelegs slender. Femora with two series of spiniferous processes bearing spines of varied sizes. Posteroventral series composed of several large processes and numerous medium-sized and small processes, series beginning at or near base of article, large basal process not longer than any of remainder, erect or slightly inclined apicad; processes and spines apically not transformed into short teeth. Anteroventral series beginning slightly distad of posteroventral series, not interrupted at base, composed of medium-sized and small processes much like those of posteroventral series. Fore tibia about three-fourths as long as femur, straight to very slightly curved, ventrally with one series of short spines of two different sizes inserted on short bases. Fore tarsus one-ninth as long as tibia or even shorter, three-segmented, weakly chitinized, hairy on all surfaces, segments of subequal size. Claws subequal in size, outer one with numerous slender, subbasal processes, inner one incised at middle, with one or two larger processes basad of incision. Mid and hind legs elongate, hind femora surpassing apex of abdomen. Segments of tarsi of mid and hind legs subequal in size. Claws slender, curved, with a moderately well-developed, medially incised, ventral lamella.

Forewings generally rather wide, surpassing apex of abdomen, in some cases emarginated on inner apical margin, with discal and with or without subbasal cell. M and Cu either free basad of discal cell, or connected to each other, thus forming subbasal cell. Pcu meeting discal cell near base of latter. Discal cell with a more or less well-developed, percurrent, longitudinal accessory vein, apically inserted on Cu or rarely free, basally mostly free. An apicad-directed branch of Cu emitted in some cases from inner margin of discal cell,

point of emission situated basad of origin of percurrent accessory vein. Rs well developed, frequently branched and forming one or two complete or incomplete small cells; a weak branch often connecting apex of Rs to apical portion of M. Pterostigma ending about at level of apex of apical discal cell, remote from wing tip. Hind wings with hamus meeting Sc+R at a sharp angle. M-cu cross vein well developed; in one case cross vein absent and hamus obsolete, fused to Cu for a considerable distance. R+M and Cu extending from level of cross vein to wing margin, former forked, distal branch of Cu in some cases connected to apical section of M.

Abdomen cylindrical, very slender, hardly widened from base to apex, lacking dorsal or ventral processes; connexival margins entire. Sternites and tergites with slender microchaetae and very long macrochaetae. Genital segments of male small in relation to size of abdomen. Seventh tergite salient apically or not. Eighth segment annular, as well-developed dorsally as ventrally. Pygophore subsemicircular in lateral view, somewhat longer than high; its posterior process spiniform, rounded or pointed apically. Parameres slender, curved, pointed apically, bearing long setae. Phallus small, symmetrical. Basal plates stout, divergent, rarely fused at middle. Phallosoma narrow-cylindrical, rather strongly sclerotized ventrally, especially on apical half, or with 1+1 large, strongly sclerotized, horn-shaped, laterally directed expansions. Basal plate struts weakly sclerotized, arising apparently from somewhat beyond base of phallosoma, directed toward dorsal wall of latter, partly fused. Endosoma membranous, simple in structure, more or less cylindrical in shape. Female genitalia with seventh sternite normal, or greatly enlarged so as to cover most of gonocoxites. Eighth tergite very short, transverse; ninth tergite large, frequently leaving strongly developed syngonapophysis exposed.

Micropterous female: General characters like those of macropterous form. Prothorax elongate pedunculate, anterior portion wider than posterior one; hind lobe indistinctly separated from fore lobe, covering extreme base of mesonotum only. Mesonotum longer than wide, but much shorter than pronotum, slightly convex above, with a not very distinct, median, longitudinal ridge. Wing pads minute. Metanotum about as long as wide, distinctly carinate longitudinally along middle; wing pads not developed. Scutellar or metanotal spines or processes absent. Abdomen elongate fusiform.

TYPE SPECIES: *Myiophanes tipulina* Reuter (monobasic).

DISTRIBUTION: Ethiopian, Oriental, Australian, and Palearctic regions.

The Australian and Palearctic regions do not possess endemic species of *Myiophanes;* one occurs in Madagascar.

OBSERVATIONS: There are three well-defined groups within the genus, separated geographically as well as morphologically. Though these differences are constant, the over-all similarity between the three divisions makes their common origin very probable; this relationship is best expressed by subgeneric status.

KEY TO THE SUBGENERA OF *Myiophanes*

1. Median portion of hind lobe of pronotum occupied by a more or less pronounced, longitudinal, subtriangular, pigment spot (fig. 80A). A free, apically directed branch of Cu emitted from inner margin of discal cell of forewing (figs. 80M; 81Q) . . . . . *Myiophanes* (*Myiophanes*)

   Pronotum uniformly testaceous, or median portion of hind lobe with a more or less pronounced, longitudinal, whitish stripe (figs. 81S; 82A). No free branch of Cu emitted from inner margin of discal cell (figs. 81V; 82L) 2

2. Pronotum constricted but in no case pedunculate (fig. 81S). Pcu-an situated at level of apex of An (fig. 81V, BB). Seventh sternite of female of normal size, leaving most of gonocoxites exposed (fig. 81AA) . . . . . *Myiophanes* (*Paramyiophanes*)

   Pronotum elongate pedunculate (fig. 82A, B). Pcu-an situated distinctly basad of level of apex of An (fig. 82L). Seventh sternite of female very large, covering most of gonocoxites (fig. 82T, U) . . . . . *Myiophanes* (*Perimyiophanes*)

The above key is intended for practical purposes only. The individual subgenera are defined under their respective headings.

Species of *Myiophanes* have been found frequently in caves, in Africa as well as in India. The cave-inhabiting species, some of which have also been found free living, do not

differ in any significant way from the remaining species of the genus.

MYIOPHANES (MYIOPHANES) REUTER

Myiophanes REUTER, 1881, p. 69.

DESCRIPTION: Only macropterous form known. Insects conspicuously hairy.

Prothorax either constricted or pedunculate; median portion of hind lobe occupied by a more or less extensive, longitudinal, subtriangular, pigment spot.

Forewings with a free, apically directed branch of Cu emitted from inner margin of discal cell; pcu-an cross vein situated at level of apex of An.

Seventh tergite of male short, not covering genitalia from above; phallotheca approximately tubular, lacking strongly sclerotized lateral expansions.

Seventh sternite of female large, covering most of gonocoxites.

TYPE SPECIES: *Myiophanes tipulina* Reuter (monobasic).

DISTRIBUTION: Oriental Region.

KEY TO THE SPECIES OF *Myiophanes* (*Myiophanes*)

1. Large discal cell of forewing with a simple, incomplete, percurrent vein arising from Cu near apex of cell (fig. 80M); pattern of wing not containing a large, rounded, pigment spot (fig. 80M) at junction of M with corium 2
   Large discal cell with numerous transverse veinlets in addition to median longitudinal vein (fig. 81Q); a large rounded pigment spot at junction of M with corium (fig. 81Q). . . . . *fluitaria*
2. Anterior lobe of pronotum white, a central oblique spot on each side fuscous; abdomen white, with five broad, transverse, fuscous annulations . . . . . *greeni*
   Coloring different 3
3. M and Cu connected basad of large discal cell, thus forming a subbasal cell 4
   These veins apparently not connected, thus forewing apparently with only one discal cell (fig. 80M) . . . . . *tipulina*
4. A pronounced rounded elevation just behind interocular furrow; femora without whitish annulus apically; forewings with distinctive pattern . . . . . *annulifera*
   Mentioned elevation absent; femora with white annulus apically; forewings without distinctive pattern 5
5. Length to apex of forewings, 13 mm. . . . . *karenia*
   Length to apex of forewing, about 18 mm. . 6
6. Head uniformly colored above; dark portion of fore femur uniform; pronotum very slender, about three times as long as width of posterior lobe, anterior lobe elongate-pedunculate (fig. 81A) . . . . . *blotei*
   Head brownish, with white spots; dark portion of fore femur with darker and lighter regions; pronotum stouter, about twice as long as width of posterior portion; fore lobe strongly constricted posteriorly, but not slenderly pedunculate . . . . . *kempi*

Myiophanes (Myiophanes) annulifera McAtee and Malloch

Myiophanes annulifera MCATEE AND MALLOCH, 1926, p. 135, fig. 35.

This is one of the few Oriental species with conspicuously marked forewings.

DISTRIBUTION: Malaya.

TYPE: Female, British Museum (Natural History).

Myiophanes (Myiophanes) blotei, new species

Figures 81A–O

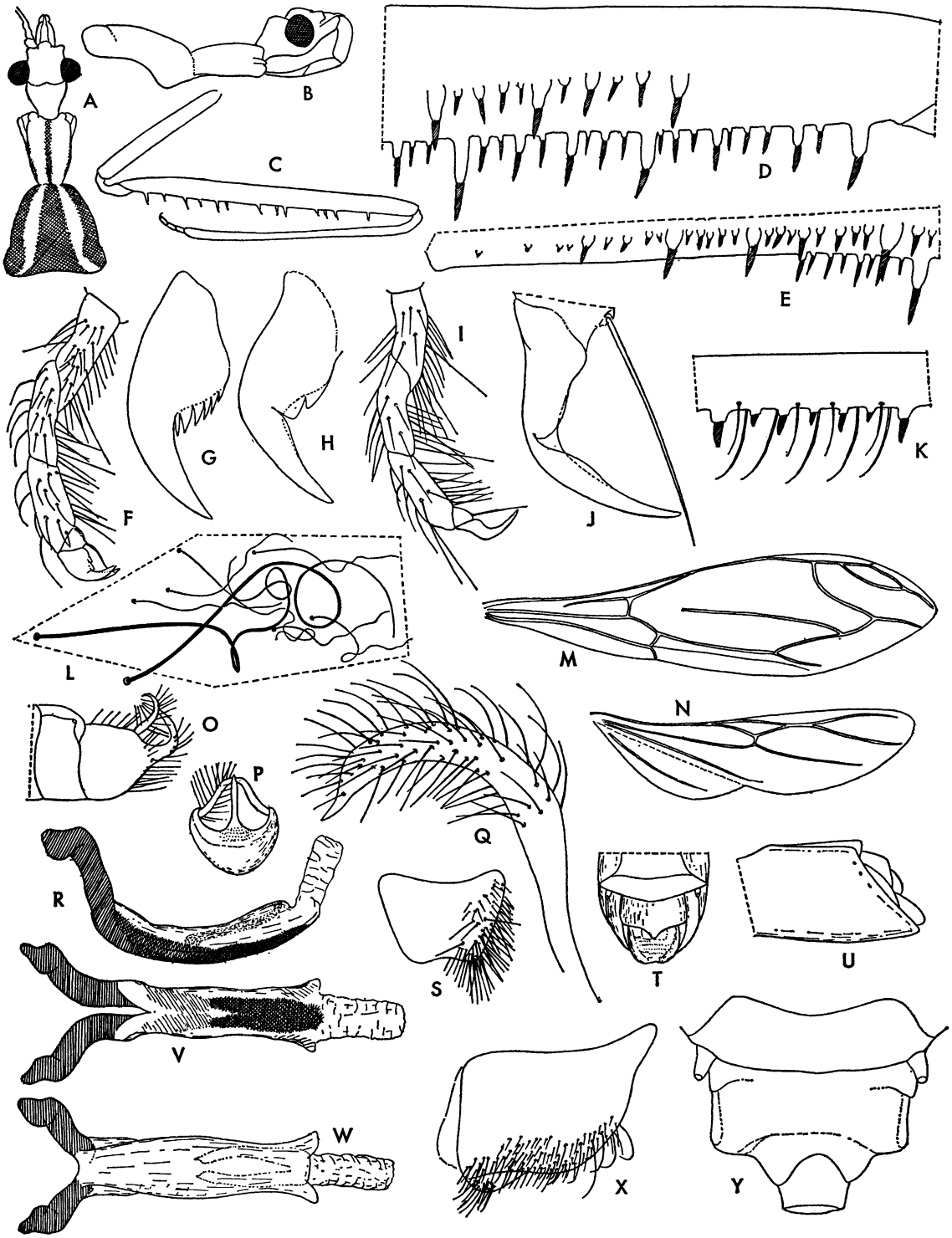
DESCRIPTION: Male: Length to apex of forewings, 17.5 mm.

General color pale ochraceous. Pronotum with faint pattern similar to that of *tipulina* (see fig. 80A). Antennae of general body color. Legs of general color, femora darker toward apex and tibiae darker toward base; femoral-tibial articulation broadly white. Forewings fuscous, membranous portion translucent; veins and their borders darker; a whitish spot on apex of pterostigma. Abdomen stramineous, connexival border fuscous. Head, thorax, abdomen, and legs with adpressed, wool-like pubescence and numerous long erect hairs, especially numerous on mid and hind legs.

Shape of head and rostrum as shown in figure 81A, B. Eyes medium-sized; their distance dorsally equal to twice their width; in lateral view not attaining level of dorsal and ventral surface of head. First and second segments of antennae with hairs about twice as long as diameter of segments; those on basal segment more numerous. Length of first segment, 10.7 mm.; relative length of segments, 1/0.97/0.13/0.17.

Shape of pronotum as shown in figure 81A, B, distinctly pedunculate, fore lobe slender.

Forelegs delicate; femur 30 times as long as


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y

wide (fig. 81C). Posteroventral series beginning a short distance from base, composed of nine to 10 large, and 70 to 75 small, spiniferous tubercles, their spines straight, very slender (fig. 81D), large ones combined with their base as long as diameter of segment; posteroventral series not attaining apex of segment. Anteroventral series beginning somewhat distad of base of posteroventral series, reaching apex of segment, composed of about 10 medium-sized, and about 80 small, spiniferous tubercles, similar to those of posteroventral series. Tibia with approximately 80 spiniferous processes of two sizes, bearing slender spines (fig. 81H). Segments of fore tarsus subequal in length; apical segment distally below with 1+1 large, more strongly pigmented setae. Outer claw with five slender, adpressed projections on basal half. Inner claw heavily sclerotized, its under surface with a well-developed, medially incised lamella; a small, blunt projection basad of incision. Mid and hind legs elongate, posterior femur surpassing apex of forewing by about 8 mm. Tarsi with second and third segments subequal, first slightly shorter; setae of tarsi long and simple. Claws slender, faintly curved, with low but distinct medially incised lamella.

Forewings surpassing apex of abdomen by 2 mm.; their shape and venation as shown in figure 81K; inner margin straight apically; subbasal cell well developed. Venation of hind wings as shown in figure 81N; hamus obsolete; m-cu cross vein not developed.

Shape of abdomen and genital region as shown in figure 81E–G, J, L. Posterior process of pygophore relatively short (fig. 81E–G). Shape and chaetotaxy of parameres as shown in figure 81 O. Shape of phallus as shown in figure 81M; its interior structure like that of *tipulina* (see fig. 80R, V, W).

MATERIAL EXAMINED: Sumatra: Medan, Goewa Maryke, January 22, 1933 (v. d. Meer Mohr; Rijksmuseum van Natuurlijke Historie), one male holotype.

This species, named for the Dutch hemipterist H. C. Blöte in acknowledgment of his work, differs from the remaining Oriental species as indicated in the key.

Myiophanes (Myiophanes) fluitaria
McAtee and Malloch

Figures 11A–C; 81P–R

Myiophanes fluitaria MCATEE AND MALLOCH, 1926, p. 135, fig. 34.

The head and pronotum, forewing, and ventral aspect of the genital region of the female of this species are illustrated.

MATERIAL EXAMINED: *Sumatra:* Medan, Hayek (Zoologische Sammlung des Bayerischen Staates), one female; Tandjong Morava, Seniang (B. Hagen; Rijksmuseum van Natuurlijke Histoire), one male. *Malaya:* Batu Cave, cavern C, February 22, 1960 (Quate; Bernice B. Bishop Museum), one male.

DISTRIBUTION: Malaya; Sumatra.

TYPE: Male, British Museum (Natural History).

Myiophanes (Myiophanes) greeni Distant

Myiophanes greeni DISTANT, 1903e, p. 205, fig. 143.

DISTRIBUTION: Ceylon.

TYPE: British Museum (Natural History).

Myiophanes (Myiophanes) karenia Distant

Myiophanes karenia DISTANT, 1903e, p. 205, fig. 144.

DISTRIBUTION: Burma.

TYPE: British Museum (Natural History).

Myiophanes (Myiophanes) kempi China

Myiophanes kempi CHINA, 1924, p. 96.

Myiophanes greeni: PAIVA, 1919, p. 366 (*nec* Distant, 1903).

This is a cavernicolous species.

DISTRIBUTION: India (Assam).

FIG. 80 (OPPOSITE PAGE). *Myiophanes tipulina.* A. Head and pronotum of female, dorsal view; color pattern shown on pronotum only. B. Head and prothorax of female, lateral view. C. Foreleg. D. Base of fore femur. E. Under surface of apex of fore femur. F. Fore tarsus. G, H. Claws of foreleg. I. Hind tarsus. J. Claw of hind leg. K. Portion of fore tibia. L. Setae of seventh sternite of female. M. Forewing. N. Hind wing. O. Genital region of male, side view. P. Pygophore, seen from behind. Q. Paramere. R. Phallus, lateral view. S. Syngonapophysis. T. Genital region of female, posterodorsal view. U. Apex of abdomen of female, lateral aspect. V. Phallus, dorsal view. W. Phallus, ventral aspect. X. Gonocoxite with gonapophysis. Y. Posterior tergites of female, as seen on slide mount.

TYPES: Cotypes, British Museum (Natural History).

Myiophanes (Myiophanes) tipulina Reuter

Figure 80A–Y

Myiophanes tipulina REUTER, 1881, p. 70.
Myiophanes pilipes DISTANT, 1903f, p. 253.
Orthunga bivittata UHLER, 1896, p. 272.
Myiophanes bivittata: FUKUI, 1926, p. 12, figs. 3, 3a.

This is the type species of the genus; it is illustrated in detail.

MATERIAL EXAMINED: *Japan:* Wakayama, "Kii.," 1929 (Sakaguchi; United States National Museum), two females; Obiso, July 15, 1937 (H. Hasegawa; United States National Museum), one female, identified by Hasegawa as *Myiophanes tipulina. China:* China-Tibet border, May 6–27, 1930, 1000 to 2000 feet (D. C. Graham; United States National Museum), one female; (D. C. Graham; the American Museum of Natural History), one male; Szechwan: Chengtu, 1932 (D. C. Graham: United States National Museum), one male.

The type of *Orthunga bivittata* Uhler was examined in the course of the present work.

DISTRIBUTION: Japan; China; Australia (New South Wales).

TYPES: Of *Myiophanes tipulina*, unknown; of *Orthunga bivittata*, United States National Museum; of *Myiophanes pilipes*, British Museum (Natural History).

MYIOPHANES (PARAMYIOPHANES), NEW SUBGENUS

Myiophanes auct. (part).

DESCRIPTION: Only macropterous form known. Insects conspicuously hairy. Prothorax constricted but in no instance pedunculate; pronotum either uniformly testaceous, or median portion of hind lobe occupied by a more or less extensive, longitudinal, white stripe.

Forewings without a free, apically directed branch of Cu emitted from inner margin of discal cell; pcu-an cross vein situated at level of apex of An.

Seventh tergite of male short, not covering genitalia from above; phallotheca bladder-like, with conspicuous, strongly sclerotized, lateral expansions.

Seventh sternite of female of normal size, leaving most of gonocoxites exposed.

TYPE SPECIES: *Myiophanes speluncarum* Jeannel.

ETYMOLOGY: *Para*, near, and *Myiophanes*, a genus of the Emesinae.

DISTRIBUTION: Ethiopian Region.

KEY TO THE SPECIES OF *Myiophanes* (*Paramyiophanes*)

1. Pronotum uniformly testaceous . . *volitans*
   Pronotum not uniformly testaceous 2
2. Subbasal cell of forewing rather broadly triangular (fig. 81V) 3
   Subbasal cell of forewing with elongate, narrow, basal portion (fig. 81BB) 4
3. Hind lobe of pronotum with a large, black spot which is bidentate anteriorly . . *scopsorum*
   Hind lobe of pronotum with two longitudinal dark bands which are somewhat narrowed anteriorly . . . . . *leleupi*
4. Pronotum testaceous, with two longitudinal brown bands extending without interruption on both lobes (fig. 81S) 5
   Pronotum yellowish, fore lobe with two dark spots, hind lobe with 1+1 submedian and 1+1 lateral longitudinal dark bands which are confluent at base . . . . . *wagneri*
5. Apex of first segment of antennae distinctly surpassing middle of abdomen; transverse vein separating subbasal and apical cell of forewing shorter than distance along Cu, between vein mentioned and pcu cross vein (fig. 81BB) . . . . . *speluncarum*
   Apex of first antennal segment not reaching middle of abdomen; transverse vein separating cells of forewing as long as distance along Cu between that vein and pcu cross vein . 6
6. Dorsal surface of abdomen uniformly testaceous; ventral surface with three longitudinal brownish bands . . . . . *jeanneli*
   Abdomen testaceous, with wide black rings . . . . . *hirsutum*

Myiophanes royi is not included in the key, owing to insufficient data.

Myiophanes (Paramyiophanes) hirsutum Villiers

Myiophanes hirsutum VILLIERS, 1949a, p. 299.

DISTRIBUTION: Tanganyika; Congo (Léopoldville).

TYPE: Female, Musée Royal de l'Afrique Centrale.

Myiophanes (Paramyiophanes) jeanneli Villiers

Figure 81S

Myiophanes jeanneli VILLIERS, 1949a, p. 298, figs. 89, 92.

Myiophanes speluncarum JEANNEL, 1919, p. 153 (part).

DISTRIBUTION: Abyssinia.

TYPE: Muséum National d'Histoire Naturelle.

Myiophanes (Paramyiophanes) leleupi Villiers

Figure 81T–Z, CC–GG

Myiophanes leleupi VILLIERS, 1953a, p. 31, fig. 1.

A few features of a male of this species are illustrated here. The irregularly distributed spines of the mid and hind tibiae (fig. 81X) are unique.

MATERIAL EXAMINED: Congo (Léopoldville): Mt. Hoyo, cave, August 1, 1959 (R. L. Usinger; collection Usinger), one male.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Female, Musée Royal de l'Afrique Centrale.

Myiophanes (Paramyiophanes) royi Villiers

Myiophanes royi VILLIERS, 1963, p. 555, fig. 37.

DISTRIBUTION: Guinea.

TYPE: Male, Muséum National d'Histoire Naturelle.

Myiophanes (Paramyiophanes) scopsorum Schouteden

Myiophanes scopsorum SCHOUTEDEN, 1928, p. 343.

Myiophanes bredoi VILLIERS, 1948, p. 441, figs. 855, 857.

This species has been illustrated by Villiers (1948a, 1949a).

DISTRIBUTION: Congo (Léopoldville).

TYPE: Unknown.

Myiophanes (Paramyiophanes) speluncarum Jeannel

Figure 81AA, BB

Myiophanes speluncarum JEANNEL, 1919, p. 153, fig. 7, pl. 5, fig. 6.

This species has been further illustrated by Villiers (1948, 1949a).

DISTRIBUTION: Kenya.

TYPE: Muséum National d'Histoire Naturelle.

Myiophanes (Paramyiophanes) volitans Miller

Myiophanes volitans MILLER, 1950, p. 189, figs. 1a–1c.

DISTRIBUTION: Rhodesia.

TYPE: Female, British Museum (Natural History).

Myiophanes (Paramyiophanes) wagneri Villiers

Myiophanes wagneri VILLIERS, 1949a, p. 299, fig. 94.

DISTRIBUTION: Southwest Africa.

TYPE: Female, Zoologisches Museum, Hamburg.

MYIOPHANES (PERIMYIOPHANES), NEW SUBGENUS

DESCRIPTION: Male (of the only species known) macropterous, female micropterous. Insects not conspicuously hairy.

Prothorax elongate-pedunculate; pronotum with very faint pigment pattern, lightest longitudinally along middle.

Forewings without a free, apically directed branch of Cu emitted from inner margin of discal cell; pcu-an across vein situated distinctly basad of level of apex of An.

Seventh tergite of male projecting posteriorly, partly covering genitalia from above; phallotheca approximately tubular, without lateral projections.

Seventh sternite of female large, covering most of gonocoxites.

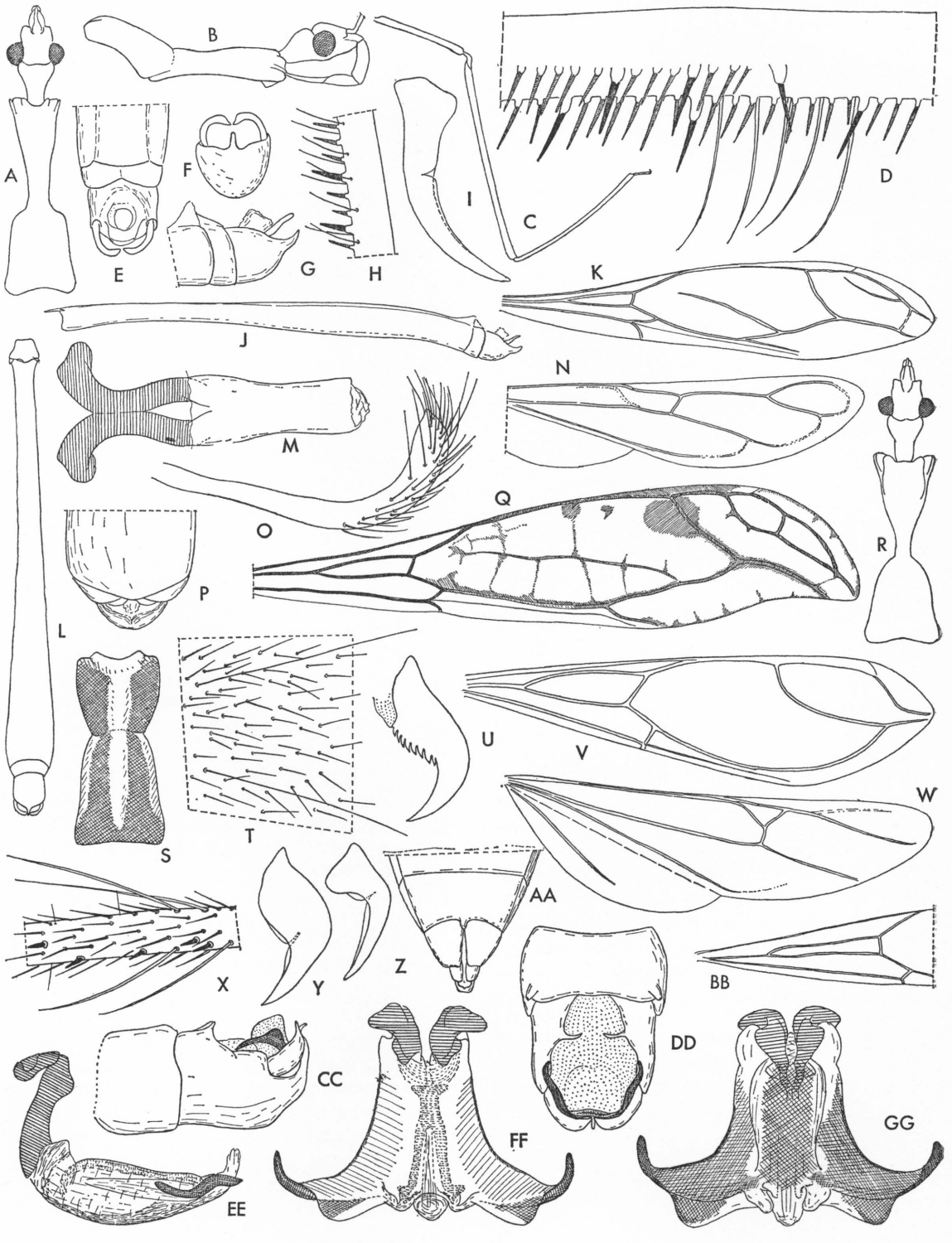
TYPE SPECIES: *Myiophanes kerzhneri*, new species.

ETYMOLOGY: *Peri*, near, and *Myiophanes*, a genus of the Emesinae.

DISTRIBUTION: Madagascar.

OBSERVATIONS: We do not know if several of the morphological features found in M. (*P.*) *kerzhneri* and described below, such as the presence of a scopula on the apical segment of the mid and hind tarsi and the lobate projections of the connexival segments of the female, are of specific or subgeneric rank, as *Perimyiophanes* is monotypic.

Myiophanes (*Perimyiophanes*) *kerzhneri* is the only representative of its genus found in


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF
GG

Madagascar. Unfortunately, the interpretation of the available evidence does not allow us to make any safe judgment of the relationships between *Perimyiophanes* and the other two subgenera. It cannot be said at this time if *Perimyiophanes* is closer to the Ethiopian *Paramyiophanes* or the Oriental *Myiophanes, sensu stricto*, or if the two latter share a common ancestor with the Madagascan subgenus. No zoogeographical conclusions can therefore be made.

Myiophanes (Perimyiophanes) kerzhneri, new species

Figure 82A–V

DESCRIPTION: Macropterous male: Length to apex of abdomen, 18 mm.

General color testaceous. Interocular furrow and lateral and ventral surfaces of head castaneous. Rostrum castaneous, apex of first, apex of second, and base of third, segments, all stramineous. Antennae stramineous. First segment with six large castaneous annuli slightly decreasing in size from basal to distal region of segment; light spaces between dark annuli somewhat larger than annuli; one very small annulus or spot situated in center of each of three preapical light areas; base and apex of segment light-colored. Second segment with six or seven piceous annuli, which are only about one-third as long as intermediate light spaces; three median light spaces each with a small dark annulus at center; base of segment stramineous, apex with white annulus. Third and fourth antennal segments brownish. Upper surface of pronotum (fig. 82A) faintly speckled with brownish, especially on anterior portion; humeri and a region at center before hind border both whitish; lateral and ventral surfaces of pronotum castaneous. Scutellum and metanotum testaceous; lateral and ventral surfaces of mesothorax and metathorax castaneous. Legs stramineous; femoral-tibial articulations broadly white. Forelegs banded with castaneous (fig. 82E). Coxae of mid and hind legs castaneous; trochantera stramineous. Mid femora with five, hind femora with six, approximately equidistant, castaneous annuli; intermediate light spaces about twice as wide as dark ones, with a few dark speckles; base of femora light-colored. Mid and hind tibiae with seven to eight narrow, approximately equidistant, castaneous annuli on basal two-thirds of segment. Forewings (fig. 82L) testaceous, dotted and spotted with brownish; a conspicuous fuliginous spot at insertion of M on submarginal vein. Abdomen castaneous, apex of parameres and terminal spine of pygophore stramineous. Head, thorax, abdomen, and legs with isolated long hairs (fig. 82A, J).

Shape of head and rostrum as shown in figure 82A, C. Interocular furrow very deep, with a short but wide median, forwardly directed extension, disc of head conspicuously elevated on each side of extension. Postocular portion of head dorsally with 1+1 small but distinct tubercles. Eyes relatively small; interocular distance equal to two and one-half times their width; in lateral view, eyes not attaining level of dorsal and ventral surface of head. First and second antennal segments with hairs from three to seven times as long as diameter of segment, in addition to shorter pilosity. Length of first segment, 9.5 mm.; relative length of segments, 1/0.97/-0.06/0.15.

Shape of pronotum as shown in figure 82A, C; fore lobe much longer than hind lobe, narrowly pedunculate.

Forelegs delicate, femora about 20 times as long as wide (fig. 82E). Posteroventral series beginning a short distance from base (fig.

FIG. 81 (OPPOSITE PAGE). A–O. *Myiophanes blotei*, male. A. Head and pronotum, seen from above. B. Head and prothorax, lateral view. C. Outlines of foreleg. D. Base of series of fore femur. E. Apex of abdomen, dorsal view. F. Pygophore, seen from behind. G. Genital region, lateral aspect. H. Portion of fore tibia. I. Claw of hind leg. J. Abdomen, lateral view. K. Forewing. L. Abdomen, seen from below. M. Phallus, dorsal aspect. N. Hind wing. O. Paramere. P–R. *Myiophanes fluitaria*, female. P. Genital region, seen from below. Q. Forewing, with color pattern. R. Head and prothorax, seen from above. S. *Myiophanes jeanneli*, pronotum, with color pattern. T–Z. *Myiophanes leleupi*, male. T. Setae of abdominal sternite. U. Outer claw of foreleg. V. Forewing. W. Hind wing. X. Portion of hind tibia. Y. Inner claw of foreleg. Z. Claw of hind leg. AA, BB. *Myiophanes speluncarum*, female. AA. Genital region, ventral view. BB. Base of forewing. CC–GG. *Myiophanes leleupi*, male. CC. Genital region, side view. DD. Genital region, seen from above. EE. Phallus, lateral view. FF. Phallus, dorsal view. GG. Phallus, ventral view.

FIG. 82. *Myiophanes kerzhneri*. A. Anterior portion of body of male, dorsal view. B. Anterior portion of body of female, dorsal view. C. Head and prothorax of male, lateral aspect. D. Thorax of female, lateral view. E. Foreleg, with color pattern. F. Praetarsus and outer claw of foreleg. G. Apex of third tarsal segment of foreleg, with inner claw. H. Tarsus of hind leg. I. Base of fore femur. J. Apex of femur and base of tibia of hind legs, with color pattern. K. Portion of hind femur. L. Forewing, with color pattern. M. Apex of abdomen of male, dorsal view. N. Apex of abdomen of male, lateral aspect. O. Phallus, dorsal view. P. Paramere. Q. Phallus, lateral aspect. R. Pygophore, seen from behind. S. Posterior process of pygophore, high magnification. T. Apex of abdomen of female, lateral view. U. Genital region of female, ventral aspect. V. Posterior portion of abdomen of female, seen from above.

82I), composed of about eight large, and 50 to 55 medium-sized and small, spiniferous tubercles, their spines straight, very slender, large ones combined with their bases slightly shorter than diameter of segment; posteroventral series not attaining apex of article. Anteroventral series beginning at level of third large process of posteroventral series (fig. 82I), reaching apex of segment, composed of about nine medium-sized, and about 45 small, spiniferous tubercles, similar to those of posteroventral series. Tibia with about 50 spiniferous processes similar to those of *M. tipulina* (see fig. 80K). Proportions of segments of fore tarsus like those of *M. tipulina* (see fig. 80F); apical segment distally below with 1+1 large, compressed, curved, spinelike setae more strongly pigmented than other setae (fig. 82F, G). Outer claw (fig. 82F) with five slender, subbasal projections; inner claw (fig. 82G) heavily sclerotized, with a deep incision at middle of under surface, a minute pointed projection basad of incision. Mid and hind legs elongate, posterior femora surpassing apex of abdomen by 6 mm. Femora and tibiae of mid and hind legs with numerous microtrichia and relatively sparse long hairs (macrotrichia) (fig. 82J, K). Mid and hind tarsi with second segment slightly shorter than either first or third; all with long hairs. Third tarsal segment on lower surface with a large number of capitate setae forming a scopula-like structure (fig. 82H). Claws slender, conspicuously curved, with well-developed, medially incised, ventral lamella (fig. 82H).

Forewings falling short of apex of abdomen by 1.5 mm.; their shape and venation as shown in figure 82L. Apical portion rounded. M and Cu free basad of discal cell, not forming a subbasal cell. Discal cell with incomplete, foldlike, percurrent vein. Pterostigma falling short of level of apex of discal cell; Rs not branched. Hind wings not examined.

Abdomen narrowly fusiform, widest on posterior third; connexival margins entire. Genital region as shown in figure 82N, R; posterior process of pygophore short, pointed (fig. 82R, S). Shape and chaetotaxy of parameres as shown in figure 82P, R. Phallus of simple structure (fig. 82 O, Q); phallotheca approximately tubular.

Micropterous female: Length, 21.2 mm.; head, 1.6; thorax, 6.9; abdomen, 12.7 mm. General color testaceous, head and body mottled and spotted with castaneous. Color pattern of head, rostrum, and antennae like that of male. Prothorax and mesothorax of general body color, metathorax entirely piceous. Pattern of legs like that of male, slightly more intense. Abdomen of general body color; tergites with numerous regularly arranged, longitudinal stripes and spots. Posterior third of connexival segments castaneous. Under surface of abdomen spotted with castaneous and testaceous. Body surface matte, under surface of abdomen slightly polished. Head, thorax, and abdomen with conspicuous, short, silvery pubescence, forming variously shaped patches. Head, body, and legs with long hairs as in male.

Head as shown in figure 82B, much like that of male, but interocular distance equal to three times width of eyes, and without distinct tubercles on postocular region.

Prothorax as shown in figure 82B, D; declivous portion of hind lobe of pronotum at center with a small tubercle. Mesothorax and metathorax as illustrated (fig. 82B, D).

Forelegs like those of male. Mid and hind legs like those of male, including number, structure, and chaetotaxy of tarsal segments.

Abdomen narrowly fusiform, widest on posterior third. Structure of tergites and sternites simple. Posterolateral angles of fourth, fifth, and sixth connexival segments shortly lobate (fig. 82V). Genital region as shown in figure 82T–V. Eighth tergite short, transverse, horizontal. Ninth tergite larger than eighth, inclined posteriorly, subrectangular, its disc slightly convex. Seventh sternite very large, covering genital appendages almost completely from sides and from below; its posterior border widely rounded. Gonocoxites, gonapophyses, and syngonapophysis not examined in detail.

MATERIAL EXAMINED: Madagascar: Périnet, December, 1932 (Olsufiev; Zoological Institut of the Academy of Sciences, Leningrad), one male holotype, one female allotype; Périnet, December 26, 1933 (Robinson; the American Museum of Natural History), one male paratype.

PHASMATOCORIS BREDDIN

Phasmatocoris BREDDIN, 1904, p. 148.

Emesa (*Phasmatocoris*): McAtee and Malloch, 1925, p. 44.

Emesa (*Rothbergia*) McAtee and Malloch, 1925, p. 44 (new synonymy).

Rothbergia: Wygodzinsky, 1945d, p. 248.

Myiagreutes Bergroth, 1911, p. 15 (new synonymy).

Emesa (*Myiagreutes*): McAtee and Malloch, 1925, p. 42.

Westermannias (*Myiagreutes*): McAtee and Malloch, 1922, p. 95.

Description: Macropterous. Small to medium-sized species (6–20 mm.).

Body from stout to moderately slender, with appendages never very delicate. Body surface from polished to only very slightly shining, with minute pubescence, rarely also with scattered long setae. Femora and abdominal segments with microchaetae and macrochaetae. Color from uniform to conspicuously patterned.

Head, fusiform, anteocular longer than postocular, latter with sides either regularly converging posteriorly or rather abruptly rounded behind eyes. Interocular furrow situated somewhat behind level of center of eyes, latter from small to large. Rostrum very slightly bent between first and second segments. First segment as long as or shorter than anteocular portion of head; second segment as long as or somewhat longer than first, at most attaining level of center of eye; third segment somewhat longer than first and second together. Antennae inserted halfway between anterior border of eyes and apex of head, or on anterior half of anteocular region. Pronotum completely covering mesonotum, variously shaped, distinctly constricted between fore and hind lobe, but in no case pedunculate; fore and hind lobe often strongly declivous in lateral view. Fore lobe with a median longitudinal furrow; humeri of hind lobe slightly elevated, in some cases 1+1+1 small processes before posterior border of hind lobe. Scutellum elevated but not spined. Metanotum with or without spine posteriorly.

Forelegs from stout to slender. Posteroventral and anteroventral series of femur of two types: either both series composed of long and short, spinelike setae inserted on small, wartlike processes, apically transformed into short teeth, anteroventral series interrupted at base, basad of interruption consisting of a single seta or numerous spinelike setae forming an apparent continuation of posteroventral series, or both series of different structure, viz., posteroventral series composed of large and small spiniferous processes invariably shorter than diameter of femur, spiniferous processes intermixed with slender spiniform setae, and anteroventral series consisting of small spines inserted on very short processes, intermixed with long and short, spinelike setae, series interrupted at base, with a single spine basad of interruption. Tibia half or somewhat more than half as long as femur, ventrally with one or two series of short, generally hooklike denticles. Tarsus three-segmented, segments subequal in size, basal one generally slightly longer than others; tarsus from one-third to one-fifth as long as tibia, rather strongly chitinized in many species, hairs of dorsal and lateral surface either numerous or rather few in number, those of under surface simple, in several species under surface of first tarsal segment with several erect, spinelike setae. Claws slightly unequal in size, outer one with two or three small, subbasal projections, inner one with a medially incised ventral lamella. Tarsus of mid and hind legs elongate, first and third segments subequal in size, second segment shorter. Claws slender, slightly curved. Medially incised ventral lamella low.

Forewings broad to narrow, rounded apically, and with discal, basal, and subbasal cells. Pcu meeting basal cell shortly basad of level of center of cell. Hind wings with hamus meeting Sc+R at a sharp angle, or gradually approaching Sc+R without meeting it. R+M and Cu extending beyond level of cross vein to near wing border, R+M conspicuously downwardly curved, indistinctly forked in one case, in others connected to apical portion of Cu by a cross vein.

Abdomen from stout to slender.

Male: Pygophore of normal size, subsemicircular to elongate oval in lateral view, hardly compressed laterally. Posterior process from spinelike to platelike in posterior view. Parameres varied in shape, from approximately rodlike to broadly triangular apically. Phallus asymmetrical. Basal plates shorter than phallosoma, strongly diverging, connected by a narrow basal bridge. Basal plate struts directed toward dorsal wall of

phallosoma, fused or not, forming a narrow or conspicuously widened sclerite. Sclerotization of dorsal and ventral wall of phallosoma developed or not. Endosoma wall covered with many tiny, in some cases hairlike, spiculets. Apical endosoma processes from slightly to very strongly asymmetrical, varied in shape and number.

Female: Genitalia simple, not strongly sclerotized.

TYPE SPECIES: Of *Phasmatocoris*, *Phasmatocoris spectrum* Breddin (monobasic); of *Emesa* (*Rothbergia*), *Emesa* (*Rothbergia*) *testaceus* McAtee and Malloch (by original designation); of *Myiagreutes*, *Myiagreutes praecellens* Bergroth (monobasic).

OBSERVATIONS: Though McAtee and Malloch (1925) have mentioned the close relationship of *Myiagreutes* and *Phasmatocoris*, the quite different structure of the armature of the fore femur in these genera seemed to indicate a considerable degree of taxonomic difference. The comparison of the male genitalia of *P. spectrum* and the species included in *Myiagreutes* shows a remarkable similarity of a clearly synapomorphic type (see figs. 86 O; 87P). This is furthermore confirmed by the presence of spines on the posterior border of the pronotum and the quite characteristic general color pattern, though these two latter characters by themselves would not necessarily be of generic value. The similarity of the highly specialized male genitalia is considered here as superseding the dissimilarity of the structure of the fore femora, and *Myiagreutes* is considered as a synonym of *Phasmatocoris*.

It has also been necessary to include *Rothbergia* in the synonymy of *Phasmatocoris*. McAtee and Malloch (1925) separated the two groups by the number of series of denticles on the under surface of the fore tibia, a feature hardly sufficient to distinguish genera. The type of *Rothbergia* and its nearest allies are admittedly quite different in their general aspect from typical *Phasmatocoris*; but others, such as *magdalenae* and its allies, are somewhat intermediate and bridge the gap between the species with one row, and those with two rows, of denticles on the fore tibiae. For the time being, no characters of truly generic value are available that would permit us to maintain *Rothbergia* as a valid taxon.

The preceding discussion and the perusal of the descriptions and illustrations in this paper show that *Phasmatocoris* demonstrates an exceptionally wide range of morphological and color characters and thus of the general aspect of the various species. In this respect, it might be pertinent to stress the equally wide range of ecological situations in which the various species can be found and which range from the tropical rain forests of the east slope of the Andes and those of the Amazonian region, where the dark, medium-sized species around *magdalenae* occur, to the semi-arid region of the Chaco, where *patquianus* is found.

KEY TO THE SPECIES OF *Phasmatocoris*

1. Ventral surface of anterior femora with slender, spinelike setae only (figs. 83L; 84E; 85E; 87E; 88I); anterolateral projections of collar rounded-truncate apically (figs. 83J; 84A, B; 85C; 87A, B; 88G); metanotum with or without spine 3
   Ventral surface of fore femora with short, spiniferous processes in addition to spinelike setae (fig. 86H); anterolateral projections of collar with long and slender, spinelike processes (figs. 86A, B); metanotum spined 2
2. Hind margin of pronotum with 1+1+1 distinct, though in some cases short, spines (fig. 86A); posteroventral series of fore femur with six or more large, spiniferous processes (fig. 86B) . . . . . *praecellens*
   Hind margin of pronotum lacking spines; posteroventral series of fore femur with at most five large, spiniferous processes . . . . . *minor*
3. Fore tibia ventrally with two series of denticles (figs. 85D; 87J; 88M) 4
   Fore tibia ventrally with a single series of denticles (figs. 83 O; 84J) 6
4. Size, almost 20 mm.; general color piceous; fore lobe of pronotum longer than wide; hind lobe before posterior margin with one median, and 1+1 humeral, toothlike processes (fig. 87A). Portion of anteroventral series of fore femur situated basad of interruption consisting of one isolated bristle (fig. 87E); parameres of male strongly widened apically (figs. 87K, M) . . . . . *spectrum*
   Size, less than 15 mm.; general color straminеous to ochraceous; fore lobe of pronotum not longer than wide, hind lobe lacking processes before posterior margin (figs. 85C;

88G). Portion of anteroventral series situated basad of interruption consisting of several setae forming an apparent continuation of posteroventral series (figs. 85E; 88I, J); parameres of male pointed apically (fig. 85I, M) 5

5. Length, more than 10 mm.; pronotum testaceous, fore and hind lobe concolorous; head twice as long as high in lateral view (fig. 85A); teeth of under surface of fore tibia hook-shaped (fig. 85D); subbasal cell of forewing more than twice as long as basal cell (fig. 85C) . . . . . *patquianus*

Length, much less than 10 mm.; fore lobe of pronotum ochraceous, hind lobe castaneous; head one and one-half times as long as high in lateral view (fig. 88H); teeth of under surface of fore tibia peglike (fig. 88M); subbasal cell of forewing less than twice as long as basal cell (fig. 88G) . . *usingeri*

6. Spinelike setae of fore femur extending to, or almost to, base of femur 7

Spinelike setae of fore femur not attaining base of article, separated from base by about length of fore tarsus (figs. 83K; 84D; 87C) 8

7. Subbasal cell of forewing shorter than basal cell; fore lobe of pronotum more or less horizontal in lateral view (as shown in fig. 83K) . . . . . *testaceus*

Subbasal cell of forewing longer than basal cell; fore lobe of pronotum strongly declivous in lateral view (as shown in fig. 85A) . . . . . *diffinis*

8. General color ferruginous to testaceous; metanotum tuberculate behind but without spine; posterior process of pygophore broad, platelike (fig. 83T) 9

General color piceous; metanotum with a short but distinct spine (fig. 83B); process of pygophore spinelike (figs. 83G; 84N, Q) 11

9. Fore lobe of pronotum very slightly longer than hind lobe (fig. 83K) 10

Fore lobe of pronotum almost twice as long as hind lobe (fig. 83E) . . . . . *borgmeieri*

10. Portion of anteroventral series situated basad of interruption consisting of a single isolated bristle; posterior process of pygophore not continuous with surface of pygophore, very short and broad, subsemicircular in outline (fig. 83D) . . . . . *rapax*

Portion of anteroventral series of fore femur situated basad of interruption consisting of several spiniform setae forming an apparent continuation of posteroventral series (fig. 83L); process of pygophore continuous with surface of pygophore, subrectangular in shape (fig. 83T) . . . . . *breddini*

11. Shape of apical portion of parameres subrectangular (fig. 84Q, S); posterior process of pygophore regularly narrowed from base to apex (fig. 84Q) . . *moraballi*

Shape of apical portion of parameres subtriangular (figs. 83H; 84I, N); posterior process of pygophore somewhat constricted beyond base, slightly widened toward middle and again narrowed toward apex (figs. 83G; 84N) 12

12. Distance from apex of antenniferous tubercles to anterior border of eyes, in lateral view, somewhat less than length of eyes (fig. 83C); parameres not indented dorsally before apex (fig. 83H) . . . . . *sturmi*

Distance from apex of antenniferous tubercles to anterior border of eyes, in lateral view, somewhat greater than length of eyes (fig. 84B); parameres indented dorsally before apex (fig. 84I) . . . . . *magdalenae*

Phasmatocoris borgmeieri (Wygodzinsky), new combination

Figure 83E

Rothbergia borgmeieri WYGODZINSKY, 1945, p. 246, figs. 4–14.

For comparative purposes, the lateral aspect of the head and thorax of this species is illustrated.

DISTRIBUTION: Brazil (Goias).

TYPE: Female, Instituto de Ecologia e Experimentacão Agrícolas.

Phasmatocoris breddini, new species

Figure 83J–U

DESCRIPTION: Male: Length, 14 mm. Shape slender.

Color ferruginous, disc of posterior lobe of pronotum possibly with 1+1 longitudinal, light-colored vittae; connexival segments with a yellowish spot anteriorly. Forewings of the general color, but somewhat translucent. Surface of head, body, and appendages slightly shining, with short inconspicuous pilosity.

Head and rostrum as shown in figure 83J, K. Eyes large, their distance dorsally equal to their width; in lateral view, eyes attaining level of ventral surface of head. First segment of antennae with numerous hairs somewhat longer than diameter of segment; hairs of second segment shorter and less numerous. Length of first segment, 8 mm.

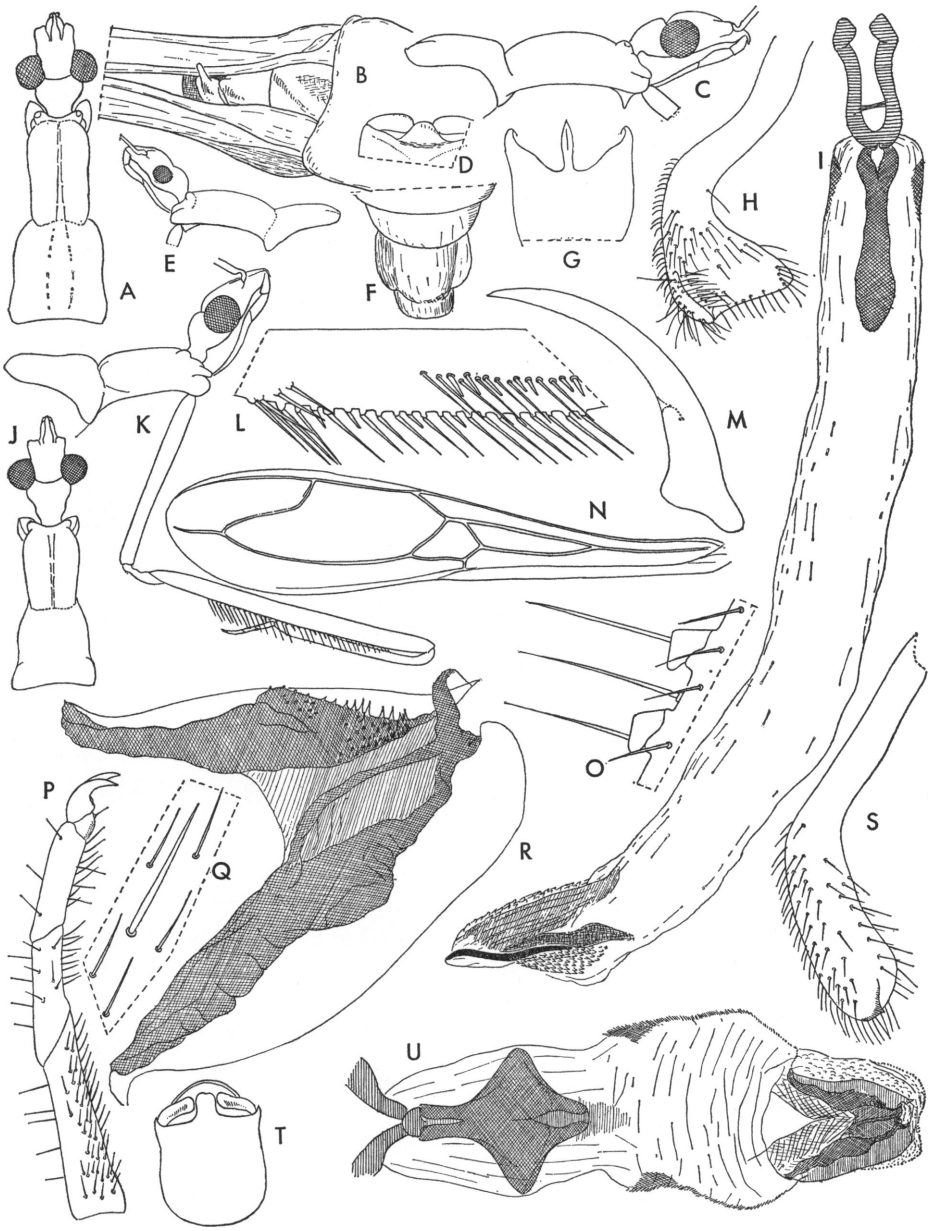


FIG. 83. A–C. *Phasmatocoris sturmi*, male. A. Head and prothorax, seen from above. B. Mesonotum and metanotum, dorsolateral view. C. Head and prothorax, lateral aspect. D. *Phasmatocoris rapax*, apex of pygophore, seen from behind. E. *Phasmatocoris borgmeieri*, female, head and prothorax, lateral view. F–I. *Phasmatocoris sturmi*. F. Genital region of female, seen from above. G. Pygophore, posterior view. H. Paramere. I. Phallus, dorsal view, with endosoma completely everted. J–U. *Phasmatocoris breddini*, male. J. Head and prothorax, dorsal view. K. Anterior portion of body, lateral aspect. L. Base of series of fore femur. M. Claw of hind leg. N. Forewing. O. Portion of under surface of fore tibia. P. Fore tarsus. Q. Setae of posterior femur. R. Apical portion of endosoma, high magnification. S. Paramere. T. Pygophore, seen from behind. U. Phallosoma, dorsal view.

Prothorax as shown in figure 83J, K. Fore lobe subcylindrical, slightly narrowed posteriorly, median longitudinal furrow shallow. Hind lobe slightly shorter than fore lobe, about as long as wide, its disc flattened, very faintly rugose transversely. Surface of fore and hind lobe microscopically reticulate. Scutellum and metanotum simple, lacking spines.

Forelegs as shown in figure 83K, L, O, P. Coxa as long as pronotum. Femur long and slender; posteroventral series beginning at some distance from base of article, composed of about 40 long and slender, and about six very short, spines; anteroventral series composed of similar though somewhat less numerous spines, basad of interruption with several spines apparently forming a continuation of posteroventral series. Tibia half as long as femur, ventrally with one series of about 45 hooklike denticles (fig. 83 O). Tarsus one-third as long as tibia, its structure and chaetotaxy as shown in figure 83P; claws as usual for the genus. Femora of hind legs attaining apex of abdomen. Claws of mid and hind legs as shown in figure 83M.

Forewings attaining apex of abdomen, their shape and venation as shown in figure 83N; basal half as long as subbasal cell.

Pygophore as shown in figure 83T; posterior process continuous with surface of pygophore, subrectangular when seen from behind. Parameres slightly widened on apical half, their shape and chaetotaxy as shown in figure 83S. Phallus as shown in figure 83U; sclerotizations of apex of endosoma asymmetrical (fig. 83R).

MATERIAL EXAMINED: Brazil: São Paulo: Juquiá, Poço Grande, April 7, 1940 (the American Museum of Natural History), one male holotype.

OBSERVATIONS: The new species, dedicated to the memory of G. Breddin, the hemipterist, can be compared to *rapax* on account of the structure of the process of the pygophore, but differs as indicated in the key.

Phasmatocoris diffinis (McAtee and Malloch), new combination

Emesa (Rothbergia) diffinis MCATEE AND MALLOCH, 1925, p. 46, figs. 60, 61.

DISTRIBUTION: Bolivia.

TYPE: Female, United States National Museum.

Phasmatocoris magdalenae, new species
Figure 84A–N, P

DESCRIPTION: Male: Length, 15 mm. Head, thorax, and abdomen ferruginous, antennae and legs testaceous; forewings ochraceous, veins concolorous. Head and body moderately shining; pubescence very short, sparse, inconspicuous.

Head as shown in figure 84A, B. Eyes large, their distance dorsally one-tenth larger than their width; rounded in lateral view, almost attaining level of ventral surface of head. Shape and relative size of rostral segments as shown in figure 84B. Antennae glabrous. Length of first segment, 9.3 mm.; relative length of segments, 1/0.95/0.13/?.

Prothorax as shown in figure 84A, B. Fore lobe of pronotum subcylindrical, somewhat widened on anterior third, with a faint but distinct median longitudinal depression. Hind lobe five-sixths as long as fore lobe, its sides almost parallel, very slightly divergent posteriorly; humeri rounded, very faintly elevated only; hind border almost straight; disc with a faint and rather wide, median, longitudinal depression. Surface of fore lobe microscopically, of hind lobe coarsely, rugose transversely. Scutellum somewhat salient behind, but without distinct tubercle or spine; metanotum with a short, slender, inclined spine apically.

Forelegs as shown in figure 84D. Coxa as long as pronotum. Distance from base of fore femur to insertion of first spiniform setae somewhat larger than length of fore tarsus. Posteroventral series composed of about 65 slender spines inserted on very short bases, those at beginning of series alternately short and long, those on distal two-thirds long only. Anteroventral series interrupted at base, not connected to posteroventral series, one seta basad of interruption (fig. 84E), remainder composed of about 70 spines similar to those of posteroventral series, but somewhat shorter. Tibia half as long as femur, ventrally with one series of about 55 small, strongly chitinized, beak-shaped spines (fig. 84F), accompanied by erect bristles. Tarsus three-eighths as long as tibia, its segments of sub-

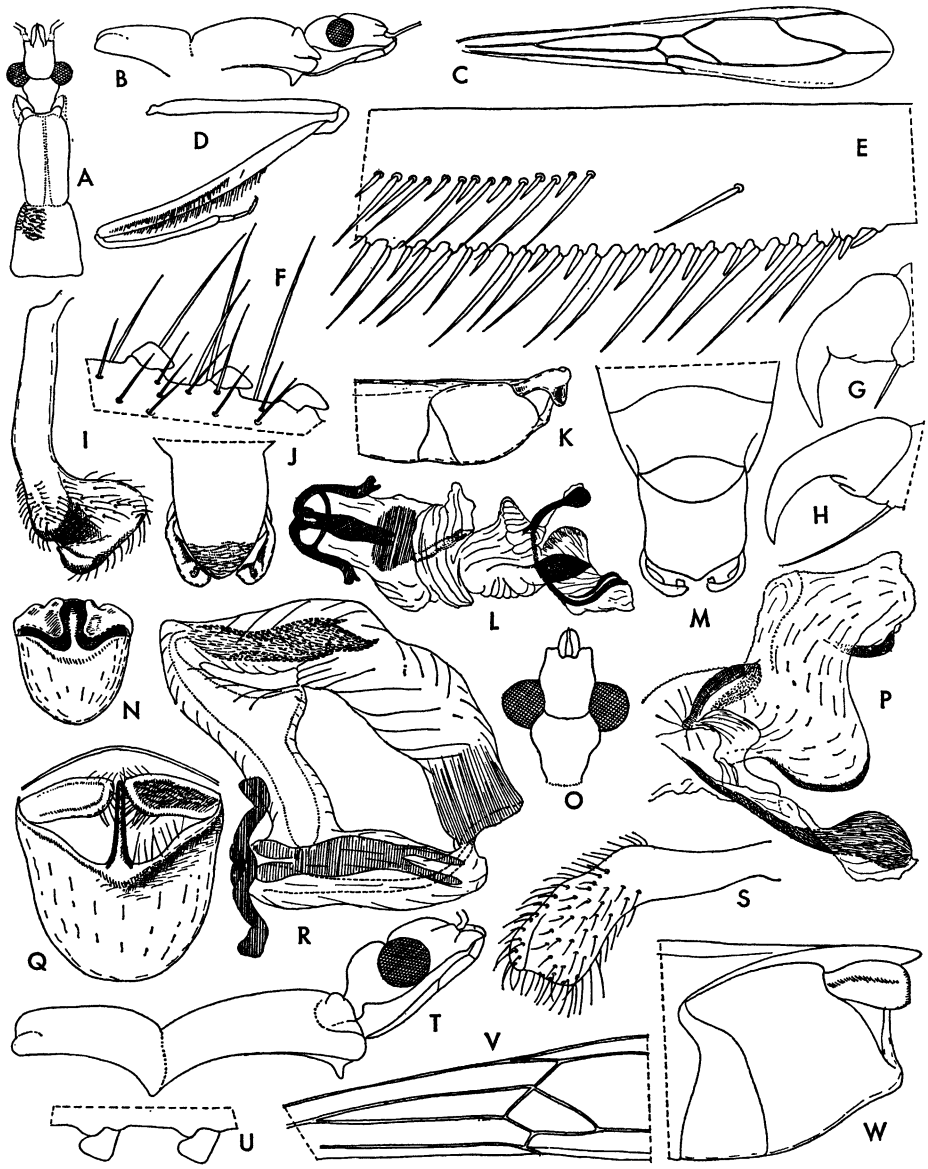


FIG. 84. A–N. *Phasmatocoris magdalenae*, male. A. Head and prothorax, dorsal view; surface sculpture shown on part of posterior lobe of pronotum. B. Head and prothorax, lateral aspect. C. Forewing. D. Foreleg. E. Base of series of fore femur. F. Portion of under surface of fore tibia. G, H. Claws of foreleg. I. Paramere. J. Genital region, seen from above. K. Genital region, lateral view. L. Phallus, dorsal view. M. Apex of abdomen, seen from below. N. Pygophore, posterior view. O. *Phasmatocoris moraballi*, male, head, dorsal view. P. *Phasmatocoris magdalenae*, apex of endosoma, seen from below, high magnification. Q–W. *Phasmatocoris moraballi*, male. Q. Pygophore, seen from behind. R. Phallus, dorsal view, phallosoma ruptured, with endosoma protruding laterally. S. Paramere. T. Head and prothorax, lateral view. U. Denticles of under surface of fore tibia. V. Portion of forewing. W. Genital region, lateral view.

equal size; claws as shown in figure 84G, H. Mid and hind legs slender, glabrous; hind femora surpassing apex of abdomen by about 5 mm.

Forewings falling slightly short of apex of abdomen; their venation as shown in figure 84C. Subbasal cell elongate, twice as long as basal cell.

Abdomen slender, fusiform, carinate below. Last tergite tongue-shaped (fig. 84J), delicately striate transversely. Shape of genital segments as shown in figure 84J, K, M, N. Posterior process of pygophore elongate, lanceolate, free, attaining level of superior border of parameres. Latter slender on basal half, triangularly widened apically, notched dorsally and subapically, their shape and chaetotaxy as shown in figure 84I–K, M, N. Structure of phallus as shown in figure 84L, P, endosoma processes strongly asymmetrical.

MATERIAL EXAMINED: Colombia: Magdalena [British Museum (Natural History)], one male holotype.

OBSERVATIONS: This species, as well as *moraballi* and *sturmi* described below, belongs to a peculiar group of rather large, dark-colored forms characterized, among other features, by the presence of a spine on the metanotum and the narrow shape of the sclerite formed by the basal plate struts of the phallus (figs. 83I; 84L, R).

Phasmatocoris minor (McAtee and Malloch), new combination

Emesa (*Myiagreutes*) *minor* MCATEE AND MALLOCH, 1925, p. 43.

This species differs from *P. praecellens* as stated in the key and in certain color characters. The structure of the phallus is much the same as that of *praecellens*, and especially that of the Colombian specimen (see below).

MATERIAL EXAMINED: Argentina:: Córdoba: Los Cocos, January, 1947 (Viana; Museo Argentino de Ciencias Naturales), two males, two females; Alta Gracia, La Granja (C. Bruch; Museo Argentino de Ciencias Naturales), one male, one female; (C. Bruch; Museo de La Plata), one female; Cabana, January 26, 1926 (Museo de La Plata), one female; Anisacote, one female; Agua de Oro, January, 1940 (De Carlo; Museo Argentino de Ciencias Naturales) one female; Catamarca (the American Museum of Natural History), one male. Santiago del Estero: (Wagner; the American Museum of Natural History), one female. Salta: Orán (Museo Argentino de Ciencias Naturales), one nymph. Jujuy: Villa Cuyaya (collection Prosen), one female; Termas de Reyes, January 29, 1948 (Instituto Miguel Lillo), one female.

DISTRIBUTION: Argentina.

TYPE: Female, Muséum National d'Histoire Naturelle.

Phasmatocoris moraballi, new species

Figure 84 O, Q–W

DESCRIPTION: Male: Length, 14 mm.

Anterior lobes of head and of pronotum piceous, posterior lobes of head and pronotum ferruginous, hind lobe of pronotum somewhat lighter-colored laterally. Antennae, rostrum, fore coxae, mid and hind femora, and sides and ventral surface of mesothorax and metathorax ferruginous; femur, tibia, and tarsus of forelegs testaceous. Forewings and ventral surface of abdomen ochraceous, eighth and ninth sternites fuscous; process of pygophore fuscous, its sides black.

Head as shown in figure 84 O, T; slightly widened immediately behind eyes in dorsal view, sides convergent posteriorly. Eyes large; their distance dorsally one-fourth larger than their width; attaining level of inferior border of head in lateral aspect. Distance from anterior border of eye to apex of antenniferous tubercle shorter than length of eye, in dorsal and lateral aspect. Rostrum slender, shape and relative size of its articles as shown in figure 84T. Antennae glabrous; length of first segment, 10 mm.; of second, 9.5 mm.

Shape of prothorax dorsally like that of *P. magdalenae*, lateral aspect as shown in figure 84T. Fore and hind lobe microscopically granulose-rugose, hind lobe not more strongly so than fore lobe; latter with a very shallow, median, longitudinal furrow dorsally along middle; hind lobe on disc centrally with an almost imperceptible longitudinal depression. Humeri faintly elevated-rounded. Scutellum and metanotum like those of *magdalenae*.

Shape, proportions, and chaetotaxy of forelegs like those of *magdalenae* (see fig. 84 D), but anteroventral and posteroventral series of femur each composed of about 50

setae only; hook-shaped denticles of tibia (fig. 84U) less strongly widened apically than those in *magdalenae*, their number slightly fewer than 50. Mid and hind legs without special characters.

Forewings similar to those of *P. magdalenae*, but basal cell not completely separating subbasal and discal cells, base of latter narrowly meeting apex of former (fig. 84V). Forewings almost attaining tip of last tergite.

Abdomen slender, fusiform, very faintly carinate centrally on basal segments. Shape

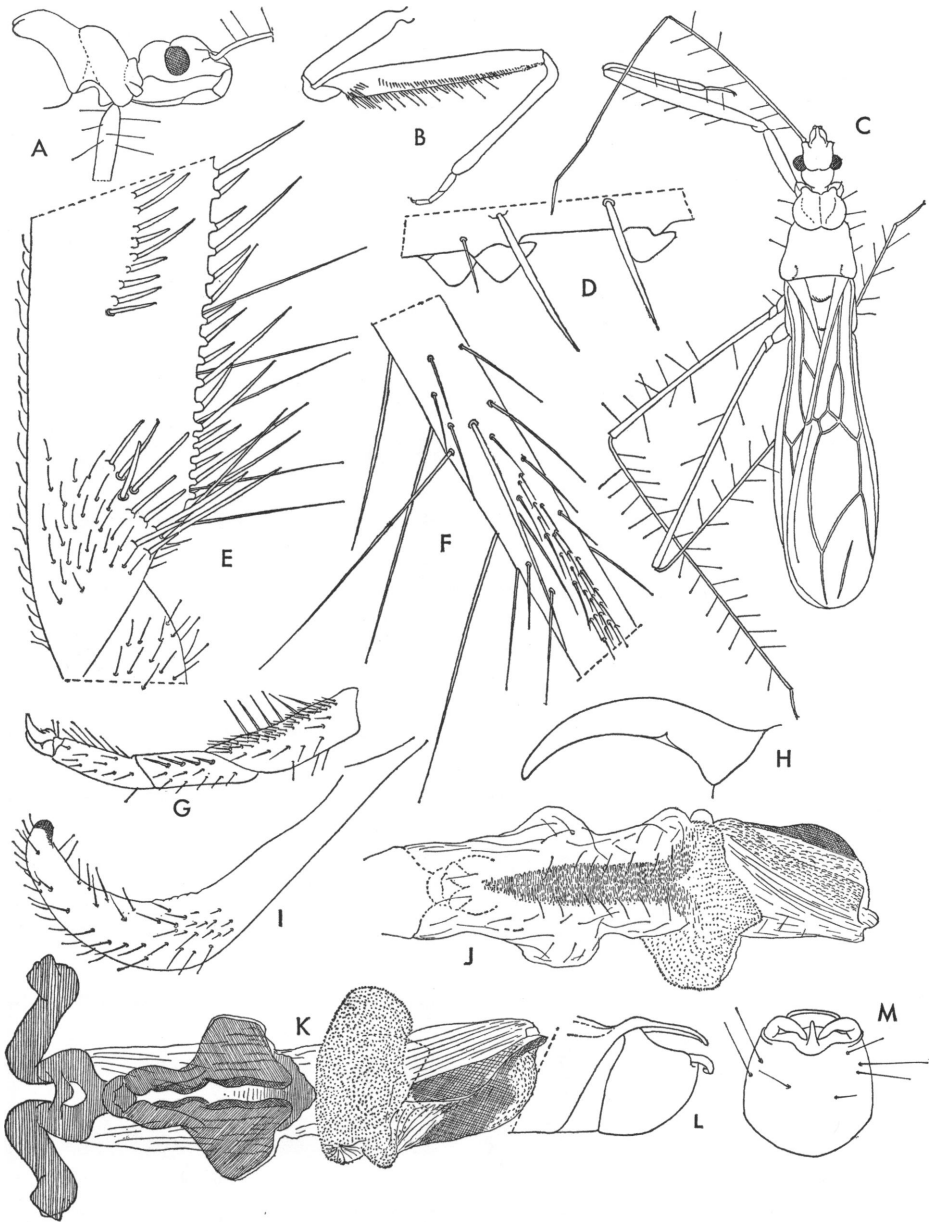


FIG. 85. *Phasmatocoris patquianus*, male. A. Anterior portion of body, lateral view. B. Foreleg. C. General aspect. D. Portion of under surface of fore tibia. E. Base of fore femur. F. Portion of posterior tibia, not all microchaetae shown. G. Fore tarsus. H. Claw of hind leg. I. Paramere. J. Phallosoma, ventral view. K. Phallus, dorsal aspect. L. Genital region, lateral view. M. Pygophore, seen from behind.

and sculpture of last tergite and shape of last sternites like those of *magdalenae*. Lateral and posterior aspect of genital segments as shown in figure 84Q, W. Posterior process of pygophore spiniform, regularly narrowed from base to apex. Shape and chaetotaxy of parameres as shown in figure 84Q, S, W, their apical portion widened, subrectangular, their outer surface somewhat impressed on disc, delicately rugose. Phallus as shown in figure 84R (somewhat deformed in preparation), its endosoma processes (shown by stippled lines) clearly asymmetrical.

MATERIAL EXAMINED: British Guiana: Essequibo River, Moraballi Creek, November 16, 1929 [Oxford University Expedition; British Museum (Natural History)], one male holotype.

OBSERVATIONS: This species approaches *magdalenae* and *sturmi*. It can be distinguished easily by the structure of the process of the pygophore and the parameres.

Phasmatocoris patquianus, new species

Figure 85A–J

DESCRIPTION: Length of male, 11.0; of female, 11.5 mm.

Color uniformly testaceous. Head, body, and appendages shining. Head, thorax, abdomen, first segment of antennae of both sexes, and legs with conspicuous elongate sensory setae (fig. 85C), most numerous on antennae and legs.

Shape of head and rostrum as shown in figure 85A, C; postocular region subsemiglobular. Eyes medium-sized, their distance dorsally twice their width in male, slightly more than twice their width in female; in lateral view not attaining level of ventral or dorsal surface of head. First segment of antennae with the long setae mentioned above, remaining segments with very short pile only. Length of first segment (male), 4.2 mm.; relative length of segments, 1/0.9/0.27/0.35.

Prothorax as shown in figure 85A, C. Anterior portion strongly declivous in lateral view, subglobular in dorsal view; disc with a deep, median, longitudinal furrow and 1+1 shallow curved depressions. Hind lobe only slightly longer than fore lobe, wider than long in dorsal view, humeri slightly elevated, disc convex, very slightly flattened along middle. Surface of fore lobe microscopically reticulate, hind lobe faintly punctuate. Mesonotum and metanotum lacking spines, slightly elevated.

Forelegs as shown in figure 85B–E, G. Coxa very little shorter than pronotum. Posteroventral series of femur beginning near base of article, composed of about 70 long and short spines, the long spines not very numerous, apically transformed into small tubercles. Anteroventral series composed of about 65 spines similar to those of posteroventral series, but somewhat shorter, those basad of interruption numerous, continuous with base of posteroventral series. Fore tibia about five-sevenths of length of femur, ventral surface with about 60 hook-shaped denticles arranged in two rows, those of outer row more numerous than those of inner row. Tarsus about one-third as long as tibia, its structure and chaetotaxy as shown in figure 85G; basal segment ventrally with about six long, erect setae; claws as usual for the genus. Mid and hind legs with setae as described above (fig. 85F), hind femur not surpassing apex of abdomen. Tarsi slender; claws as shown in figure 85H.

Forewings attaining apex of abdomen, their venation as shown in figure 85C; basal cell subquadrate, subbasal twice as long as basal cell.

Abdomen rather wide, distinctly carinate below. Shape of genital segments of male as shown in figure 85L, M. Process of pygophore spiniform, short, plainly visible. Shape and chaetotaxy of parameres as shown in figure 85I. Shape and structure of phallus as shown in figure 85J, K; sclerite formed by basal plate struts short and wide; endosoma processes strongly asymmetrical.

MATERIAL EXAMINED: *Argentina:* La Rioja: Patquía (Breyer; Museo de La Plata), one male holotype, from collection Denier; Iliar, January 8, 1940 (M. Gómez; Museo Argentino de Ciencias Naturales), one female allotype; Patquía, January, 1933 [Hayward; British Museum (Natural History)], one male paratype. *Formosa:* Ingeniero Juarez, March, 1940 (García-Bachmann; the American Museum of Natural History), one male paratype. *Bolivia:* Santa Cruz: between Warnes and Montero, January 28, 1958, found dead in spider web (Wygodzinsky; the American Museum of Natural History), one female.

OBSERVATIONS: The specimen from Formosa is slightly darker than the typical specimens from La Rioja but agrees in all morphological details. The Bolivian specimen is smaller than the specimens from Argentina (10 mm.), but as color and morphological characters seem to agree, it is also placed in *patquianus*.

This species is well characterized by its rather stout body, the shape of the pronotum, and the numerous long sensory hairs, unique in the genus.

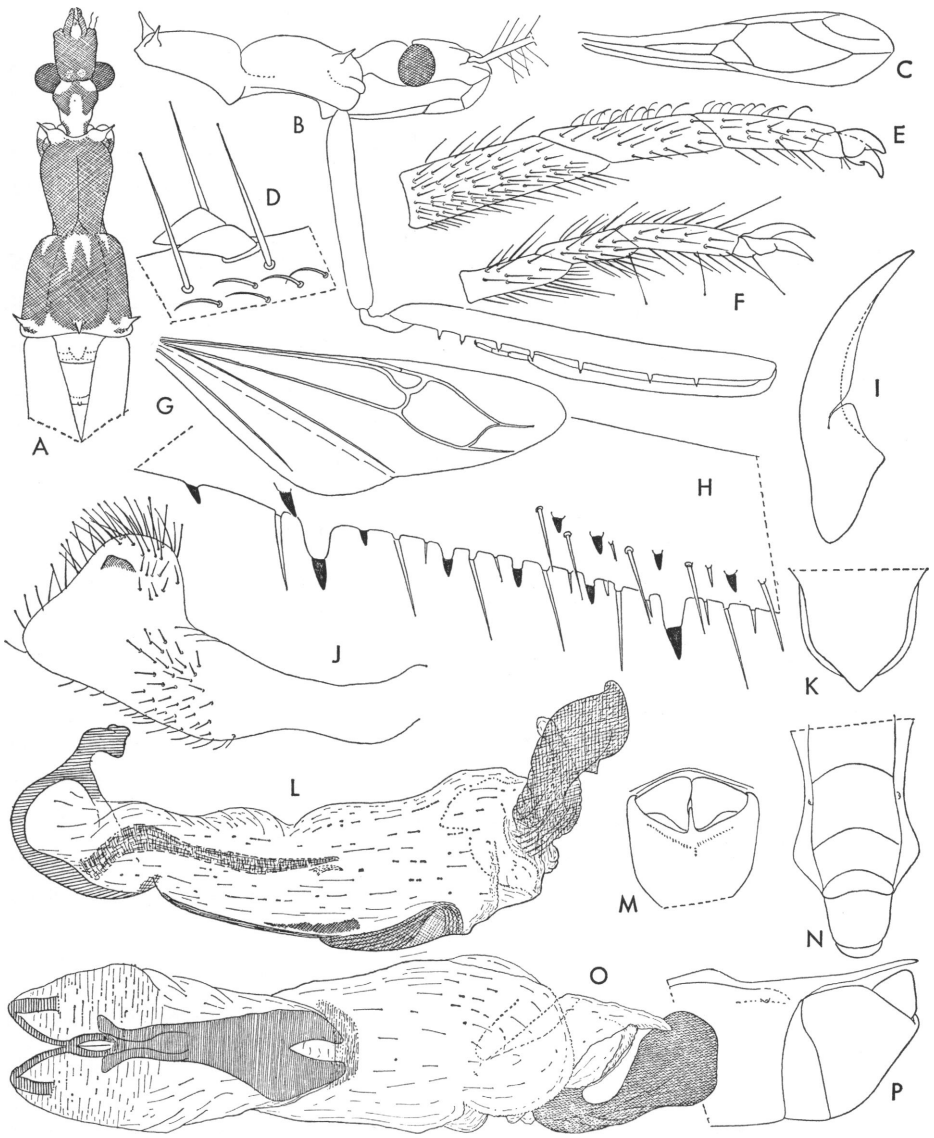


FIG. 86. *Phasmatocoris praecellens*, male. A. Anterior portion of body, seen from above; color pattern shown on head and pronotum. B. Anterior portion of body, lateral view. C. Forewing. D. Portion of under surface of fore tibia. E. Fore tarsus. F. Posterior tarsus. G. Hind wing. H. Base of fore femur. I. Claw of hind leg. J. Paramere. K. Genital region, seen from above. L. Phallus, lateral view. M. Pygophore, as seen from behind. N. Apex of abdomen, ventral view. O. Phallus, dorsal aspect. P. Apex of abdomen, lateral view.

Phasmatocoris praecellens (Bergroth), new combination

Plate 2, figure 2; text figure 86A–P

Myiagreutes praecellens BERGROTH, 1911, p. 15.
Emesa (Myiagreutes) praecellens: MCATEE AND MALLOCH, 1925, p. 42, figs. 54, 55.

The main morphological characters of this species are illustrated herein. The examination of the male genitalia has shown that in the material enumerated below there are possibly two different species, indistinguishable by external characters. The phallus of the male from Santa Cruz de la Sierra is shown in figure 86L, O; that of the male from Colombia, though similar in general structure, is larger, more strongly sclerotized, with the platelike extensions underlying the base of the articulatory apparatus much more conspicuous (as in *spectrum*, fig. 87P). For the time being, and because of the impossibility of establishing which is the true *praecellens*, no specific separation is made in this material.

MATERIAL EXAMINED: *Bolivia:* Chapare, Zischka (the American Museum of Natural History), one female; 7 kilometers northwest of Santa Cruz de la Sierra, January 26, 1958, under base of palm-tree frond (Wygodzinsky; the American Museum of Natural History), one male. *Brazil:* São Paulo: Marilia, November, 1946 (the American Museum of Natural History), one female. Pará: June (Carnegie Museum), one male. *Paraguay:* Villarica (F. H. Schade; Naturhistorisches Museum, Basel), one female. *Colombia:* Río Suarez, August 15, 1946, 900 meters (Richter; the American Museum of Natural History), one male.

DISTRIBUTION: Panama; French Guiana; Brazil (Pará, São Paulo); Colombia; Bolivia; Paraguay.

TYPE: Museum Zoologicum Universitatis.

Phasmatocoris rapax (McAtee and Malloch), new combination

Figure 83D

Emesa (Rothbergia) rapax MCATEE AND MALLOCH, 1925, p. 45, figs. 57, 58.

The shape of the upper border of the pygophore of the male holotype is illustrated here.

DISTRIBUTION: Argentina.

TYPE: Male, United States National Museum.

Phasmatocoris spectrum Breddin

Figures 87A–P; 88A–F

Phasmatocoris spectrum BREDDIN, 1904, p. 148.
Emesa (Phasmatocoris) spectrum: MCATEE AND MALLOCH, 1925, p. 44, fig. 56.

As this is the type of the genus, a redescription based on the type specimen seems useful.

DESCRIPTION: Male: Length, 19.5 mm.

Head, thorax, and appendages testaceous. Space between veins at level of basal cell of forewing flavescent. Apex of mid femur and base of mid tibia narrowly stramineous. Abdomen ochraceous, eighth and ninth segments with parameres testaceous.

Head and body dull, virtually glabrous.

Shape of head as shown in figure 87A, B, D. Shape and relative size of segments of rostrum as shown in figure 87B. Eyes large, their distance dorsally equal to two-thirds of their width; subcircular in lateral view, almost attaining level of ventral border of head. Antennae glabrous; length of first segment, 10.8 mm.; relative length of segments 1/1.02/0.065/-0.11.

Prothorax as shown in figure 87A, B, D. Fore lobe subcylindrical, with a distinct, very narrow, median, longitudinal impression. Angles of collar salient, subglobular, truncate anteriorly. Hind lobe of pronotum almost as long as fore lobe, separated from same by a rather conspicuous depression, its sides slightly diverging posteriorly, disc with a rather wide but shallow, median, longitudinal impression. Humeri slightly elevated, apically with a small but distinct point; a similar point also at center before hind border. Surface of pronotum microscopically reticulate, that of hind lobe also faintly and delicately rugose transversely. Mesonotum and metanotum lacking spine, simply rounded behind.

Forelegs as shown in figure 87C, E, F, J. Fore coxa as long as four-fifths of pronotum in lateral view. Distance from base of fore femur to insertion of first spiniform seta slightly but distinctly shorter than length of fore tarsus. Posteroventral series composed of about 70 slender, spiniform setae inserted on short, wartlike bases, with several short spines interspersed on basal portion (fig. 87E). Anteroventral series basad of interruption with a single, isolated, spiniform seta, remainder composed of about 60 setae similar to

those of posteroventral series, though somewhat shorter. Tibia distinctly more than half as long as femur, ventrally with two series totaling about 80 small, very strongly chitinized, pointed, deflexed spines, accompanied by stout, erect bristles. Tarsus one-fifth as long as tibia, shape and chaetotaxy of segments as shown in figure 87F. Claws subequal in size, their structure as shown in figure 87F. Mid and hind legs slender, with short bristles only, tarsi and claws as shown in figure 87I.

Forewings attaining apex of abdomen; their venation as shown in figure 87D, G. Hind wings well developed, their venation as shown in figure 87H.

Abdomen slender, fusiform, very faintly carinate below along middle. Shape of genital segments as shown in figure 87K, L, N, O. Eighth sternite deeply emarginate at center behind. Posterior process of pygophore elongate-lanceolate, its point hidden between parameres; latter narrow at base, triangularly widened apically, their chaetotaxy as shown in figure 87M. Phallus asymmetrical, not examined in detail.

OBSERVATIONS: The type bears no locality label but has been described as from Bolivia.

Another specimen (poorly preserved) also examined by McAtee and Malloch (1925), labeled Yungas de la Paz, 1000 meters (not 100 meters as reported by McAtee and Malloch) seems very similar, but the fragment of a mid or hind femur present shows several wide light- and dark-colored annuli; the genitalia are not preserved.

Two additional specimens, a male (Bolivia: Songo [Zoologisch Museum]) and a female (Brazil: Amazonas: Manaos [Naturhistorisches Museum, Vienna]), are also provisionally included here. Both are somewhat darker than the type, fuscous rather than testaceous; the femora-tibial articulation of the hind leg is white, as in the mid leg. The anterior portion of the hind lobe of the pronotum is stramineous, as are the extreme base of the forewings and a rather wide region across the basal cell (fig. 87D). The phallus of the male and the genitalia of the female are illustrated here (figs. 87P; 88A–F). The former is characterized by a very heavily sclerotized, curved, platelike endosoma process and a double shieldlike structure underlying the region of the insertion of the phallosoma on the articulatory apparatus. This general structure of the phallus is also found in the species formerly included in *Myiagreutes*, which differ mainly by the less abruptly widened and slightly but distinctly asymmetrical basal plate struts (fig. 86O).

DISTRIBUTION: Bolivia; Brazil (Amazonas).

TYPE: Male, Deutsches Entomologisches Institut.

Phasmatocoris sturmi, new species

Figure 83A–C, F–I

This species is so similar to *magdalenae* that only the differential characters are mentioned here.

DESCRIPTION: Length of male, 16 mm.; of female, 17 mm. Color piceous, forewings with a faint purplish tinge.

Head and thorax as shown in figure 83A, C. Eyes larger than those of *magdalenae*, i.e., in lateral view larger than distance from their anterior border to apex of antenniferous tubercle. Rugosity of hind lobe of pronotum hardly more conspicuous than that of fore lobe.

Shape of process of pygophore as shown in figure 83G, slightly shorter than that of *magdalenae*. Parameres as shown in figure 83H, without subapical notch. Phallus (with endosoma fully evaginated) as shown in figure 83I, apical portion of endosoma very different from that of *magdalenae*. Shape of genital region of female as shown in figure 83F.

MATERIAL EXAMINED: Colombia: La Tagua, 100 to 300 meters, May 10, 1956, in rotten tree trunk, *in copula* (Sturm; the American Museum of Natural History), one male holotype, one female allotype.

Phasmatocoris testaceus (McAtee and Malloch), new combination

Emesa (*Rothbergia*) *testaceus* MCATEE AND MALLOCH, 1925, p. 45, fig. 59.

This is the type species of *Rothbergia*.

DISTRIBUTION: Guatemala.

TYPE: Female, United States National Museum.

Phasmatocoris usingeri, new species

Figure 88G–M

DESCRIPTION: Length of male, 6.5; of female, 6–7 mm.

Head and its appendages, anterior portion of prothorax, all of mesothorax and metathorax, abdomen, and legs ochraceous; posterior portion of prothorax castaneous; forewings fuscous, veins castaneous. Head, body and legs polished, forewings dull. Surface of body and appendages with long sensory hairs much as in *patquianus* (see fig. 85C), though slightly less numerous.

Shape of head and rostrum as shown in figure 88G, H; postocular portion of head semiglobular. Eyes small, their distance dorsally from two to three times their width in female, laterally not attaining level of dorsal and ventral surface of head; their distance dorsally twice their width in male, laterally attaining level of ventral but not of dorsal surface of head. Antennae of female glabrous; length of first segment, 3 mm.; relative length of segments, 1/0.8/0.23/?.

Prothorax as shown in figure 88G, H. Fore lobe strongly declivous in lateral view, subrectangular, with sides somewhat divergent anteriorly in dorsal aspect; median longitudinal furrow deep, lateral portion convex, smooth. Hind lobe subrectangular in dorsal view, only slightly convex above; center of disc from smooth to faintly rugose transversely; humeri elevated. Mesonotum and metanotum lacking spines.

Forelegs as shown in figure 88I, J, L, M. Coxa slightly longer than prothorax in lateral view. General structure of femur like that of *patquianus* (see above); postero-ventral series with about 36 spines, antero-ventral series with about 30. Tibia half as long as femur; ventral spines peg-shaped, outer series with about 18 spines, inner series with five. Tarsus half as long as tibia, its structure as shown in figure 88L; ventral surface of basal segment with about nine short, erect setae; claws as usual for the genus. Hind femora surpassing apex of abdomen by about 0.5 mm.

Shape and venation of forewings as shown in figure 88G; basal cell from hardly (fig. 88G) to distinctly shorter than subbasal cell.

Abdomen distinctly carinate below; its shape as shown in figure 88K.

Female: Genital region as shown in figure 88A–C, E, F.

Male: Genital region similar to that of *patquianus* (see fig. 85L, M), but eighth sternite longer ventrally, pygophore somewhat more elongate in lateral view and its posterior process more slender; parameres much like those of *patquianus*.

MATERIAL EXAMINED: Panama: Canal Zone: Barro Colorado Island, April, 1945 (Zetek; United States National Museum), one female holotype; Fort Kobe, August 4, 1961, light trap (F. S. Blanton; the American Museum of Natural History), one female paratype; Cermeno, September 11, 1952 (F. S. Blanton; United States National Museum), one male allotype; Patino, August 29, 1952 (F. S. Blanton; United States National Museum), one female paratype.

OBSERVATION: This is the smallest species of the genus, easily recognized by its color and structural characters. It is named for R. L. Usinger, who has done so much to further our knowledge of the Hemiptera.

Phasmatocoris spp.

Several species of *Phasmatocoris* presently before me, although not described in this paper, are worth mentioning for various reasons.

A female from Barro Colorado Island, Panama, seems to be indistinguishable morphologically from the South American *spectrum*, but its slightly smaller size, shining body surface, and more contrasting color pattern, with the somewhat more extensive light-colored regions make its independent specific status probable.

A species from Mazatlan, Mexico, possessing two rows of denticles on the fore tibia, is unlike any other of the described species. It is mentioned here because it constitutes the northernmost record for *Phasmatocoris*.

Two females from the rain forests of the Yungas de Chapare, Bolivia, belonging to the group around *magdalenae*, also remain undescribed. One of the females is brachypterous, the fore and hind wings reaching the base of the third abdominal segment only. It is interesting to note that in the same region,

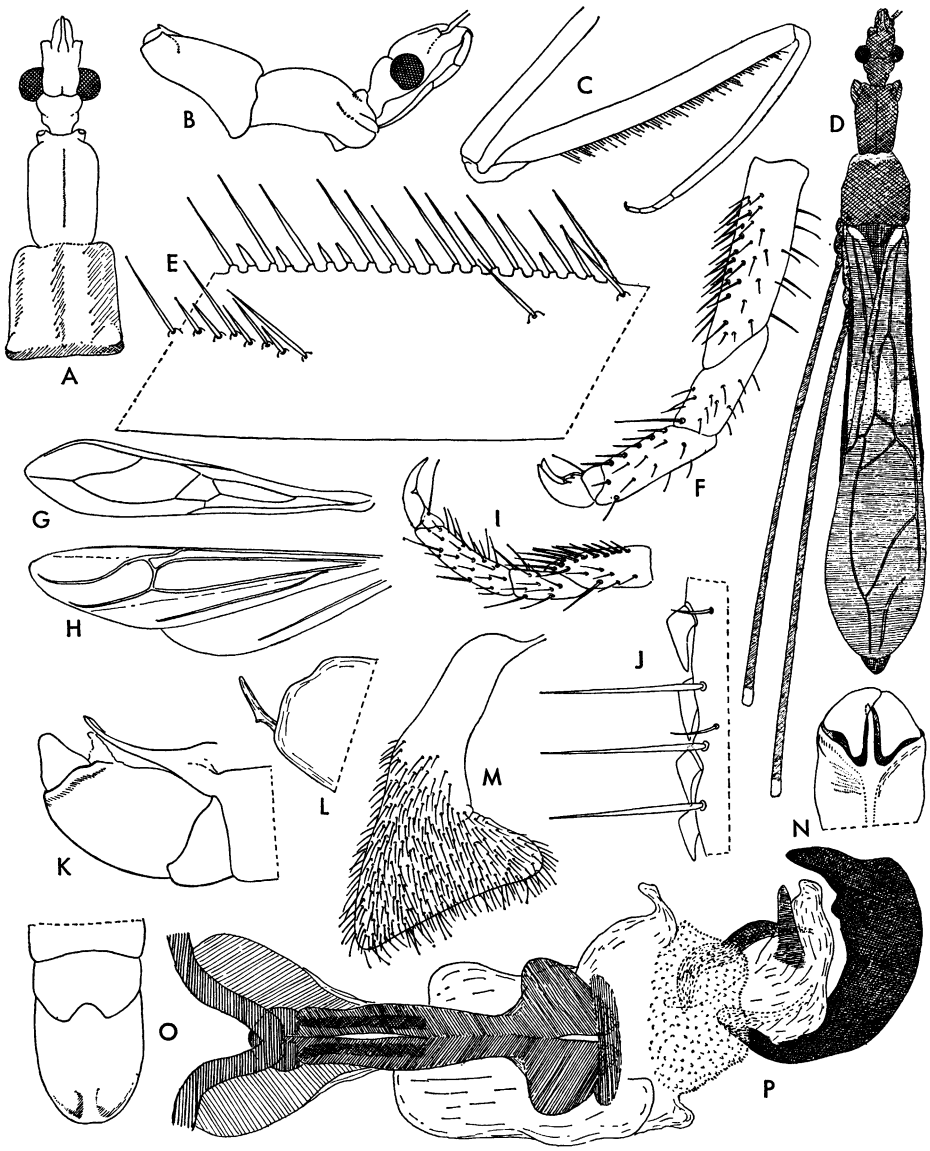


FIG. 87. *Phasmatocoris spectrum*. A–C. Male holotype, Bolivia. A. Head and pronotum, dorsal view. B. Head and prothorax, lateral aspect. C. Foreleg. D. Female from Songo, general aspect, with color pattern. E–O. Male holotype, Bolivia. E. Base of series of fore femur. F. Fore tarsus. G. Forewing. H. Hind wing. I. Posterior tarsus. J. Detail of under surface of fore tibia. K. Genital region, lateral view. L. Apex of pygophore, with process, lateral view. M. Paramere. N. Pygophore, seen from behind. O. Genital region, ventral aspect. P. Male from Manaos, phallus, dorsal view; articulatory apparatus not completely shown.

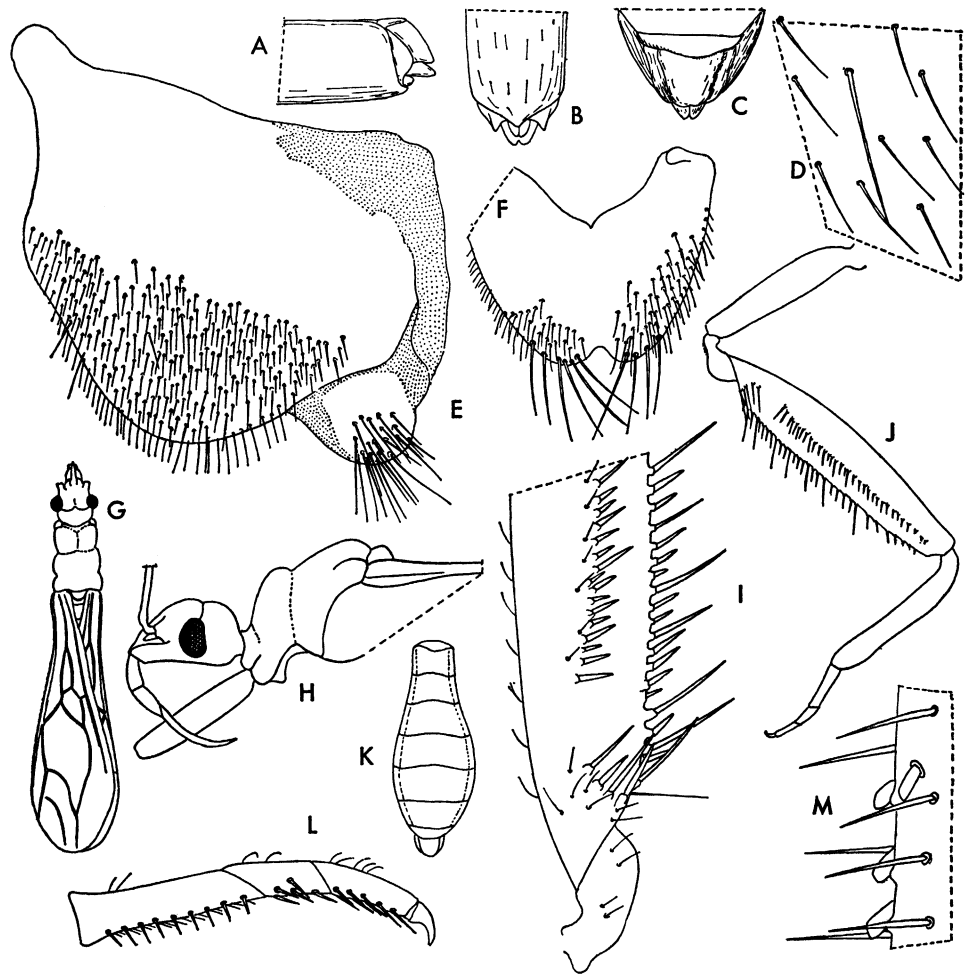


FIG. 88. A–F. *Phasmatocoris spectrum*, female from Songo. A. Apex of abdomen, lateral view. B. Genital region, seen from below. C. Genital region, posterior view. D. Setae of seventh sternite. E. Gonocoxite with gonapophysis. F. Syngonapophysis. G–M. *Phasmatocoris usingeri*, female. G. General aspect. H. Anterior portion of body, lateral view. I. Trochanter and base of fore femur. J. Foreleg. K. Abdomen, dorsal view. L. Fore tarsus. M. Detail of under surface of fore tibia.

at an altitude of about 1000 meters, other reduviids were also found to be represented by brachypterous forms, for example, the stenopodine *Pnohirmus spinifer* Stål.

Additional undescribed species now at hand are less remarkable than those mentioned above and do not widen the scope of the genus as to its morphology or range.

POLAUCHENIA McATEE AND MALLOCH

Polauchenia McATEE AND MALLOCH, 1925, p. 47.

DESCRIPTION: Macropterous or brachypterous. Medium-sized species (11–20 mm.), conspicuously marked insects. Body slender, with delicate appendages.

Body surface from dull to slightly shining, pronotum in some cases slightly wrinkled. Body and legs with short pubescence and with sparse to very numerous long hairs, latter occasionally forming tufts on mid and hind legs.

Head from short to elongate-fusiform; anteocular region as long as or slightly shorter than postocular region, latter convex above, with sides more or less converging

posteriorly, not abruptly constricted; behind interocular furrow dorsally frequently with 1+1 tubercles or short spines. Interocular furrow situated slightly posterior to level of middle of eyes, curved posteriorly. Rostrum with first and second segments stout, second in some slightly swollen; distinctly bent between first and second segments, both subequal in length, second attaining level of center of eyes, third somewhat longer than second. Antennae inserted at or before middle of anteocular region of head.

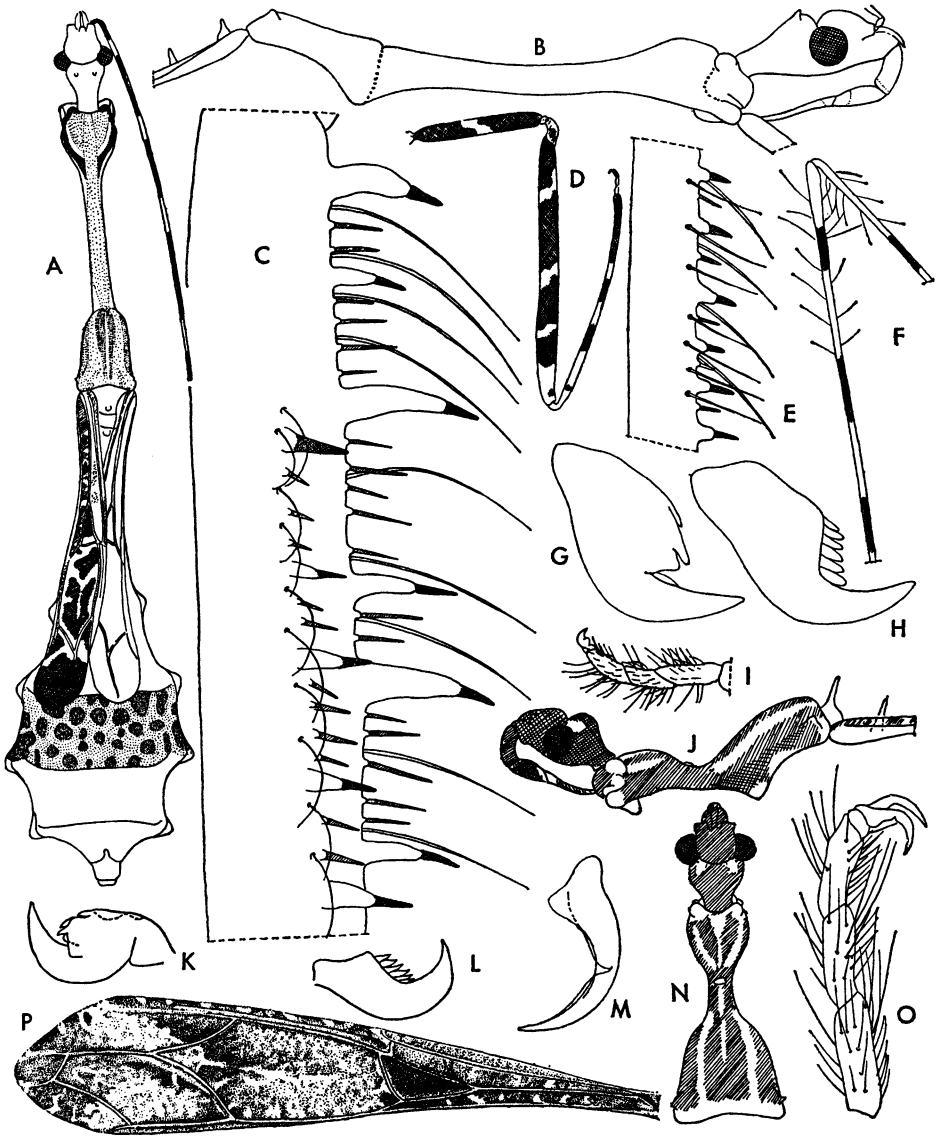


FIG. 89. A–H. *Polauchenia marcapata*, female. A. General aspect; color pattern shown on antenna, prothorax, one forewing, and one abdominal tergite. B. Anterior portion of body, side view. C. Base of fore femur. D. Foreleg, with color pattern. E. Portion of fore tibia. F. Apex of femur and base of tibia of hind leg, with color pattern. G, H. Claws of foreleg. I–P. *Polauchenia schubarti*. I. Fore tarsus. J. Anterior portion of body, lateral view, with color pattern. K, L. Claws of foreleg. M. Claw of hind leg. N. Head and prothorax, dorsal view, with color pattern. O. Posterior tarsus. P. Forewing, with color pattern.

Pronotum completely covering mesonotum, pedunculate; petiole from slightly shorter to much longer than fore lobe of pronotum. Fore lobe semioval; posterior lobe bell-shaped, humeri distinctly tuberculate or spined, frequently a spine also at center of hind border of pronotum. Scutellum and metanotum spined.

Forelegs from stout to slender. Posteroventral series of femur beginning at base of article, composed of large and small spiniferous processes bearing relatively slender apical spines; large processes of subequal size, basal process either straight or slightly inclined toward apex of article. Anteroventral series beginning somewhat apicad of posteroventral series, not interrupted at base, composed of medium-sized and small, generally slender spines inserted on short bases. Both series often accompanied by strong, elongate setae. Tibia little shorter than femur, slender, very slightly curved apically, ventrally with one series of small, slender spines of two sizes, inserted on small protuberances. Fore tarsus very short, one-seventh as long as tibia or less, three-segmented, basal segment slightly larger than second and third, which are subequal in size, weakly chitinized, hairy on all surfaces. Claws subequal in size, outer one with five to six small, submedian projections, inner one incised ventrally beyond middle, and with two or three processes basad of incision. Mid and hind legs medium-sized to long, hind femur considerably surpassing apex of abdomen; femora with microchaetae and scattered, delicate macrochaetae. Tarsi of mid and hind legs slender, three segments subequal in size. Claws curved, with a moderately well-developed, medially incised, ventral lamella.

Forewings slender, not emarginated apically, with discal and basal cell; Pcu meeting basal cell at level of apex of cell; latter pointed at base, with a single, basally directed vein emitted from it. Pterostigma falling considerably short of apex of forewing. Hind wings with hamus approaching Sc+R gradually, basally fused to same. R+M and Cu extending from level of cross vein to near wing border, former bifurcate near base. Anal lobe with region between 2A and hind border conspicuously sclerotized.

Abdomen slightly widened toward posterior half; connexival borders from slightly to distinctly lobate. Sternites with microchaetae and macrochaetae.

Male: Last tergite subsemicircular, not longer than wide. Eighth sternite large; pygophore subsemicircular in lateral view, its posterior process truncate and slightly emarginate apically. Parameres simple in structure, slightly curved, with not very numerous setae. Phallus symmetrical. Basal plates fused at insertion of phallobase and at middle. Basal plate struts fused, with exception of extreme base; resulting sclerite slender, elongate, emarginated apically. Phallosoma largely membranous, in some cases with weakly developed lateral projections; its dorsal wall weakly sclerotized apically, a ventral sclerotization also present. Endosoma membranous, of somewhat complex structure (not examined in fully evaginated state).

Female: Genitalia simple, eighth and ninth tergites weakly sclerotized.

Brachypterous female: General characters of macropterous female; forewings reduced, reaching to about middle of abdomen, clearly not functional; however, wing venation complete. Hind wings strongly reduced. Abdomen generally wider than in macropterous forms, always conspicuously lobate.

TYPE SPECIES: *Polauchenia protentor* McAtee and Malloch (original designation).

DISTRIBUTION: Neotropical Region (Costa Rica to southern Brazil).

OBSERVATIONS: The genus is now known from four named species. Several additional species are before me; some of their characters have been incorporated into the generic description.

KEY TO THE SPECIES OF *Polauchenia*

1. Petiole of pronotum much longer than fore lobe (figs. 89A, B; 90A, B) 3
   Petiole of pronotum little if any longer than fore lobe (fig. 89J, N) 2
2. Size, 11 mm.; spines of scutellum and metanotum yellowish; postocular region of head lacking projections (fig. 89J, N) . . *schubarti*
   Size, 16 mm.; spines of scutellum and metanotum black; postocular region of head dorsally with 1+1 pointed, conical tubercles . . . . . *biannulata*
3. Brachypterous female, 17.5 mm.; shape and

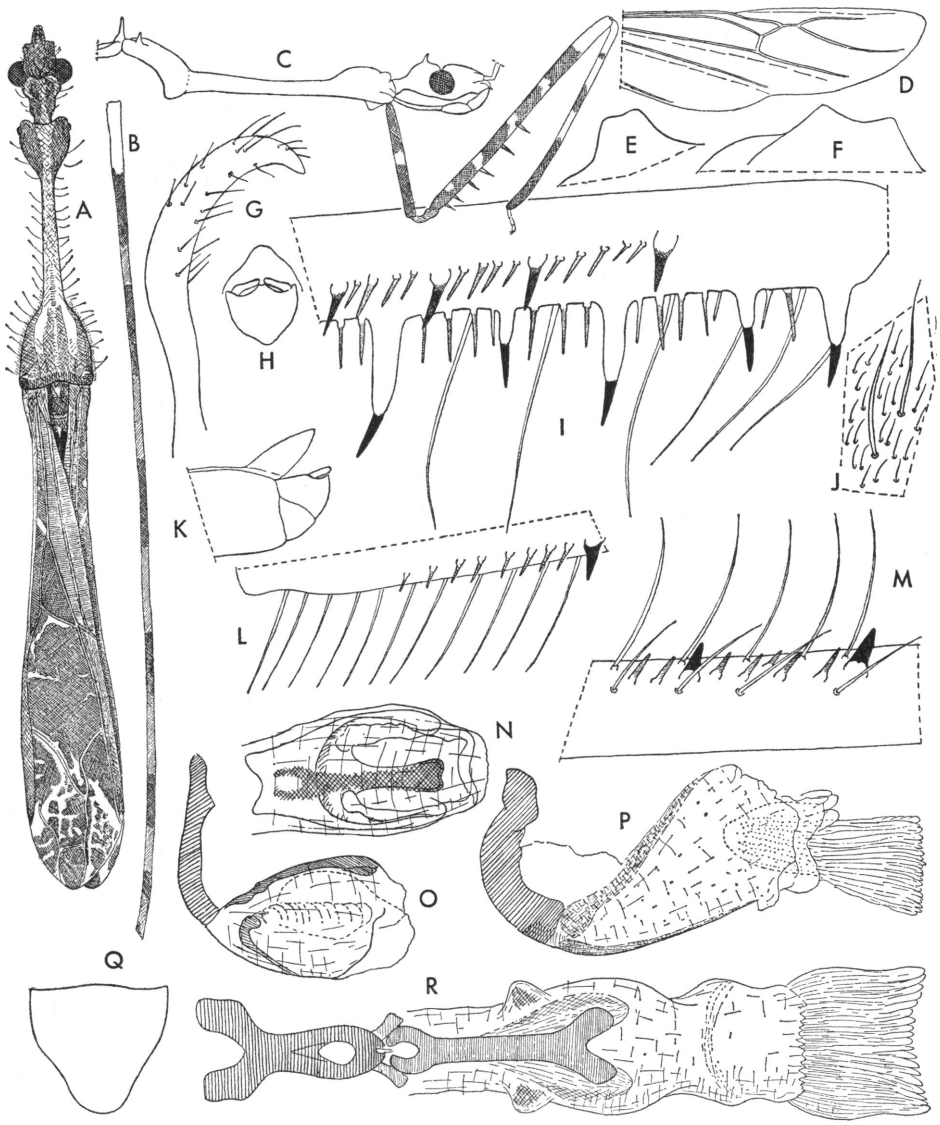


FIG. 90. A–D. *Polauchenia protentor*, male. A. General aspect, with color pattern. B. Posterior femur, with color pattern. C. Anterior portion of body, lateral view; color pattern of foreleg only shown. D. Portion of hind wing. E. *Polauchenia schubarti*, apex of pygophore. F–I. *Polauchenia protentor*. F. Apex of pygophore. G. Paramere. H. Pygophore, seen from behind. I. Base of fore femur. J. *Polauchenia schubarti*, male, setae of abdominal sternite. K–M. *Polauchenia protentor*, male. K. Genital region, lateral view. L. Detail of under surface of apex of fore femur. M. Portion of fore tibia. N, O. *Polauchenia schubarti*. N. Phallosoma, dorsal view. O. Phallus, lateral view. P. *Polauchenia protentor*, phallus, lateral view. Q. *Polauchenia schubarti*, male, seventh tergite. R. *Polauchenia protentor*, phallus, dorsal view.

pattern of thorax and forewings as shown in figure 89A . . . . . *marcapata*

Fully winged male or female, not more than 15 mm.; shape and pattern of thorax and forewings of male as shown in figure 90A . . . . . *protentor*

Polauchenia biannulata McAtee and Malloch

Polauchenia biannulata McAtee and Malloch, 1925, p. 48, fig. 66.

Distribution: French Guiana.

Type: Male, Carnegie Museum.

Polauchenia marcapata, new species

Figure 89A–H

Description: Brachypterous female: Length, 17.5 mm.

General color brown, pattern elements from white to piceous. Head piceous, uniformly covered with short, adpressed, silvery pile, with exception of 1+1 spots laterally behind eyes; labrum yellowish. Rostrum castaneous; apex of first, apical third of second, and extreme base of third segment flavous. First antennal segment stramineous, with five dark annuli, one rather narrow at base, three following progressively longer, fifth apical, hardly longer than first; basal annulus uniformly fuscous, remainder ochraceous, with their base and apex fuscous; white space between four basal annuli shorter than annuli, subapical white space as wide as apical annulus. Pronotum ochraceous, somewhat darker on fore lobe; hind lobe with 1+1 submedian and 1+1 sublateral longitudinal bands fuscous. Pubescence moderately dense, golden. Scutellum and metanotum fuscous, their spines flavescent, their pubescence dark. Lateral and ventral surface of mesothorax and metathorax piceous, completely covered with very dense, silvery white pubescence. Forelegs flavescent, annuli fuscous, their arrangement as illustrated in figure 89D. Coxae and trochantera of mid and hind legs fuscous, covered with dense, adpressed pubescence; mid and hind femora flavescent, with five fuscous annuli spaced evenly over length of segment; light-colored regions somewhat wider than dark annuli; base and apex of femora light-colored. Mid and hind tibiae stramineous, on basal half with three narrow, fuscous annuli. Color pattern of forewings as shown in figure 89A, pattern elements fuscous, large apical spot fuliginous. Dorsal and ventral surface of abdomen with dense, adpressed pile; dorsally silvery white, spotted with dark (fig. 89A), ventrally dark, with faint, longitudinal, flavescent stripes.

Body surface in addition to dense adpressed pile with long isolated hairs, also present on legs.

Shape of head and rostrum as shown in figure 89A, B. Postocular region moderately declivous behind, dorsally behind eyes with 1+1 distinct, pointed, conical elevations. Eyes relatively small, their distance dorsally about twice their width; subcircular in lateral view, not attaining level of upper or lower surface of head. First segment of antennae with short hairs only, its length, 7.2 mm.; remaining segments not preserved.

Pronotum as shown in figure 89A, B. Fore lobe moderately widened only. Petiole cylindrical, rather stout, twice as long as fore lobe; hind lobe with sides parallel on anterior half, somewhat diverging posteriorly; humeri tuberculate; hind border distinctly emarginated. Disc of hind lobe smooth, almost imperceptibly rugose on anterior half. Spines of scutellum and metanotum very short, covered with rather dense pubescence.

Forelegs as shown in figure 89C–H. Coxa as long as petiole of pronotum. Posteroventral series of femur composed of about 10 large and medium-sized spiniferous processes, and about 40 very short protuberances which bear rather slender, short, spinelike setae (fig. 89C). Large processes combined with apical spines not more than four-fifths as long as diameter of segment, all of almost identical size. Anteroventral series composed of about 15 medium-sized, spiniferous projections, apical spine about as long as process, and about 60 short spinelike setae inserted on very short bases. Series of setae accompanying anteroventral series of projections composed of delicate setae, series accompanying posteroventral series composed of strong and long setae (fig. 89C). Ventral surface of tibia with about 60 spines inserted on short bases, alternately short and long (fig. 89E), more slender toward base of article, accompanied by two series of subequal long and strong setae. Tarsus as given in generic description, claws as shown in

figure 89G, H. Mid and hind legs slender, elongate, hind femora surpassing apex of abdomen by 7.5 mm.

Abdomen as shown in figure 89A, narrow at base, strongly widened posteriorly, connexival segments lobate, projections of last three segments of about equal size. Ventral surface rather flattened on basal half, moderately convex on apical half; projections on dorsal or ventral surface lacking. Spiracles not elevated.

MATERIAL EXAMINED: Peru: Marcapata River [J. Kalinowski; British Museum (Natural History)], one female holotype; Valle Chanchamayo, 1400 meters, 1939 (Weyrauch; Instituto Miguel Lillo), one female paratype.

OBSERVATIONS: The differences between the new species and *protentor*, to which it is possibly allied, can best be appreciated with the aid of the illustrations given in this paper.

Polauchenia protentor McAtee and Malloch

Figure 90A–D, F–I, K–M, P, R

Polauchenia protentor MCATEE AND MALLOCH, 1925, p. 47, figs. 63–65.

The female described by McAtee and Malloch is possibly very slightly brachypterous, as shown by the somewhat modified shape of its forewings. A male identified (but not published) by the authors of the species is illustrated here. The figures are self-explanatory.

MATERIAL EXAMINED: Panama: Cano Saddle, Gatun Lake, May 13, 1923 (R. C. Shannon; United States National Museum), one male.

DISTRIBUTION: Panama.

TYPE: Female, United States National Museum.

Polauchenia schubarti Wygodzinsky

Figures 89I–P; 90E, J, N, O, Q

Polauchenia schubarti WYGODZINSKY, 1950b, p. 81, figs. 31–47.

This species, which is here partly illustrated, is superficially similar to species of the genus *Stenolemus* on account of its shape, coloring, and abundant hairs.

DISTRIBUTION: Brazil (São Paulo; Estado do Rio).

TYPE: Male, Instituto Oswaldo Cruz.

PROTOGARDENA, NEW GENUS

DESCRIPTION: Macropterous. Slender, large-sized species (20–22 mm.).

Body surface partly highly polished. Bristles short, pointed, macrochaetae distinct but only slightly larger than microchaetae. General color dark, almost concolorous.

Head elongate, anteocular slightly shorter than postocular combined with neck; sides of postocular region rather conspicuously converging posteriorly, especially in lateral view. Eyes subcircular in outline, small; interocular furrow situated slightly behind level of middle of eyes, almost straight across. Rostrum slender, segments not conspicuously thickened; first segment very short, not reaching behind level of antenniferous tubercles, second attaining level of center of eyes; third longest. Rostrum bent between first and second segments. Antennae inserted near apex of head.

Forelegs very slender and elongate. Spined portion of femur about half as long as total length of article. Structure of posteroventral and anteroventral series like that in *Gardena*. Tibia shorter than half of length of femur, ventrally with one series of peglike teeth. Tarsus and claws like those of *Gardena*. Mid and hind legs like those of *Gardena*.

Forewings simply rounded apically, falling considerably short of tip of abdomen. Discal cell large, its apex approaching wing tip; basal cell narrow but well developed. Pcu meeting basal cell near apex of latter. Hind wings attaining tip of forewings. M meeting Cu apicad of level of caesura and remaining fused to Cu for a short distance. R+M and Cu projecting beyond level of cross vein to wing border, not subdivided and not connected to each other. Anal lobe attaining three-fourths of length of wing.

Abdomen slender, slightly widened toward apical third.

Male: Projection of seventh tergite tongue-shaped, attaining level of apex of pygophore. Eighth sternite well developed, visible on its whole surface. Pygophore normal in structure, viz., large, slightly compressed laterally, anterior dorsal bridge very short, posterosuperior process spinelike. Parameres rod-shaped, slightly clavate, curved, meeting behind. Phallus symmetrical, much as in

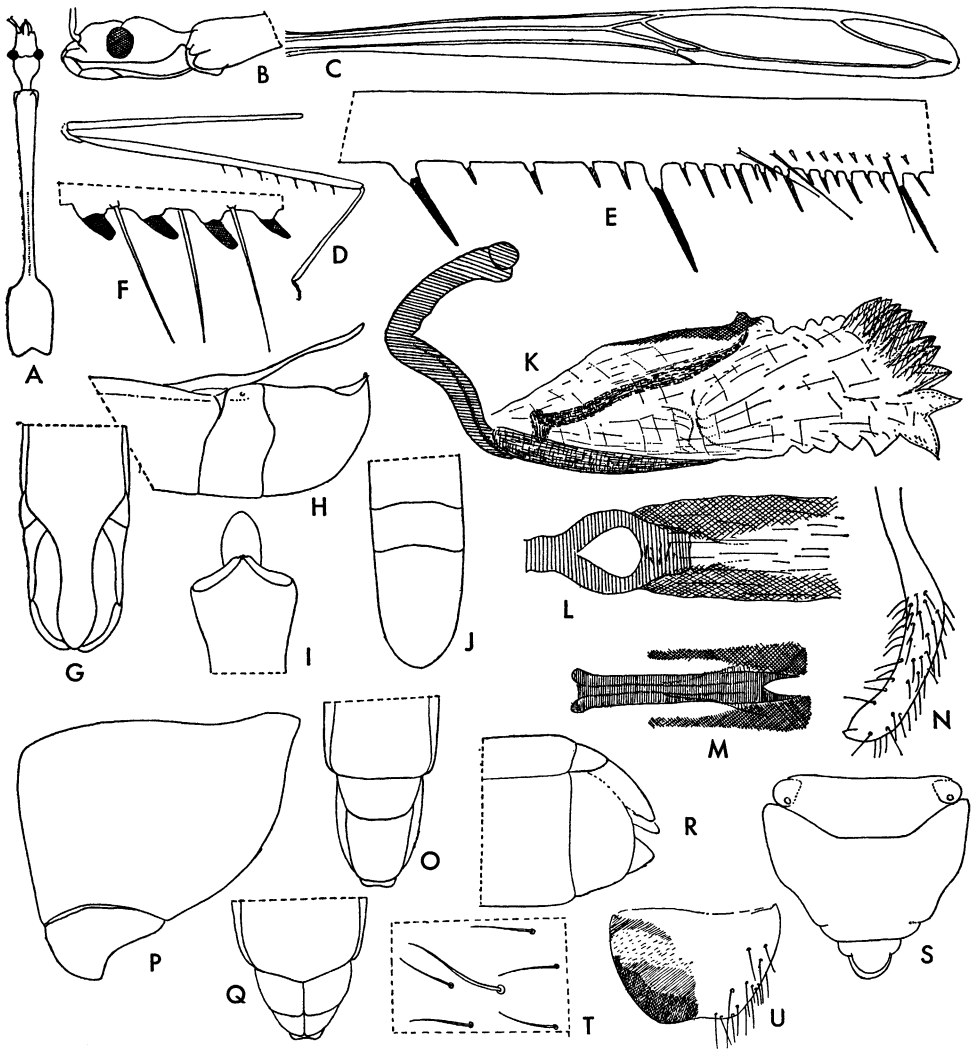


FIG. 91. *Protogardena boliviana*. A. Head and prothorax, dorsal view. B. Head and anterior portion of prothorax, lateral view. C. Forewing. D. Foreleg. E. Base of series of fore femur. F. Detail of under side of fore tibia. G. Genital region of male, dorsal view. H. Apical region of abdomen of male, lateral view. I. Pygophore, seen from behind. J. Apex of abdomen of male, ventral aspect. K. Phallus, lateral view. L. Base of phallosoma, ventral aspect. M. Sclerotization of dorsal wall of phallosma, with struts. N. Paramere. O. Genital region of female, seen from behind. P. Outlines of gonocoxites and gonapophysis. Q. Genital region of female, ventral view. R. Apex of abdomen of female, lateral aspect. S. Posterior tergites, as seen on slide mount. T. Setae of abdominal sternite. U. Syngonapophysis.

brevicollis group of *Gardena*, but endosoma lacking numerous, delicate, spinelike projections, these apparently transformed into a small number of subtriangular, transverse, sclerotized plates above and below secondary gonopore.

Female: Dorsal covering of genital segments formed by eighth and ninth tergite;

inclined posteriorly; tenth tergite not distinct. Center of seventh sternite slightly salient. Gonocoxites separated; gonapophyses well developed. Syngonapophysis shallowly emarginate posteriorly.

TYPE SPECIES: *Protogardena boliviana*, new species.

ETYMOLOGY: *Protos*, first; and *Gardena*, a genus of the Emesinae.

DISTRIBUTION: Bolivia; Peru.

OBSERVATIONS: There is no doubt that *Protogardena* and *Gardena* are very closely related, as shown by the peculiar structure of the rostrum, the chaetotaxy of the fore femora, the venation of the hind wings, the extremely elongate discal cell of the forewing, and other features. Furthermore, *Protogardena boliviana* shares with many, but not all, species of *Gardena* such apomorphic characters as the very slender body, the highly polished surface of certain parts, and the abbreviation of the series of the fore femora. I believe that these characters may have arisen more than once in the group (Vavilov's law of parallel variation in homologous series). It is considered as more significant that all species of *Gardena* are synapomorphic as to the loss of the basal cell of the forewing and the existence of an apparent tenth tergite in the female. *Protogardena* is plesiomorphic in that it has a basal cell, and there is no apparent tenth tergite in the females. The structure of the male genitalia cannot be used here to deduce phylogenetic relationships because in at least three of the four species groups of *Gardena*, as well as in *Protogardena*, we find different autapomorphic conditions not derivable from one another.

Protogardena boliviana, new species

Figure 91A–U

DESCRIPTION: Length of male, 20.2 mm.; head, 1.4; thorax, 6.7; abdomen, 12.1 mm.; length of female, 22 mm.

General color dark piceous to black. Rostrum, antenniferous tubercles, 1+1 spots behind eyes, antennae, anterior acetabula, forelegs and connexival margin narrowly, dark brown; first article of antennae somewhat lighter toward base. Posterior lobe of pronotum entirely black. Coxae and trochantera of mid and hind legs light ochraceous, femora and tibiae castaneous, former darker on distal, and latter on proximal, portion; apex of femora and base of tibiae white, white portions on third wider than on second pair. Forewings very dark brown, veins black; extreme base of forewing white.

Body surface smooth, covered with very short, adpressed pile; sides of fore lobe of pronotum delicately striate transversely; hind lobe of pronotum as well as mesothorax and metathorax bare, highly polished.

Shape of head of male and female as shown in figure 91A, B; sides of postocular region rather conspicuously converging posteriorly. Distance between eyes dorsally about twice their width, their shape circular in lateral view, not attaining level of dorsal or ventral surface of head. Length of first segment of antennae of male, 13 mm., with not very numerous hairs not quite twice as long as diameter of segment. Length of first segment of antennae of female, 13.5 mm.; relative length of segments, 1/0.95/0.075/0.2.

Shape of pronotum dorsally as shown in figure 91A. Fore lobe very long and slender, its posterior portion dorsally with a distinct longitudinal furrow; posterior border of hind lobe rather deeply emarginate between humeral angles.

Forelegs very long and slender (fig. 91D). Femur slightly narrower at center than at base or apex; basal spineless section slightly shorter than half of length of femur, four times as long as apical spineless section. Posteroventral series composed of seven to eight very long and slender, as well as numerous short to very short, spines (fig. 91E); anteroventral series like that of *Gardena* (fig. 91E). Tibia about two-fifths as long as femur, peglike teeth of its ventral surface as shown in figure 91D. Length of posterior femur, 19–20 mm., surpassing apex of abdomen by about 7 mm.

Forewings reaching slightly beyond middle of abdomen; their venation as shown in figure 91C.

Ventral carina of abdomen absent. Genital region of male as shown in figure 91G–J. Projection of seventh tergite slender, somewhat constricted submedially. Seventh and eighth sternite slightly emarginate behind.

Process of pygophore blunt at apex (fig. 91I). Parameres as shown in figure 91N; details of phallus, as in figure 91K–M. Genital region of female and details of structure of its sclerites as shown in figure 91O–U.

MATERIAL EXAMINED: *Bolivia:* Rurrenabaque, Beni River, July 17, 1957 (Kuschel; the American Museum of Natural History), one male holotype; Cristalmayu, Cochabama, 1949 (the American Museum of Natural History), one female allotype. *Peru:* Quincemil, Cuzco, August 14–31, 1962, 2400 feet (L. E. Peña; the American Museum of Natural History), one male.

SCHOUTEDENOCORIS VILLIERS

Schoutedenocoris VILLIERS, 1961, p. 38.

DESCRIPTION: Macropterous. Small-sized species (6 mm.).

Body surface subshining to polished, pilosity from short to long but never dense, longer setae frequently inserted in small, dark, glabrous spots. Body dark; antennae and legs conspicuously spotted and annulated; forewings spotted and marbled. General body shape stout.

Head relatively short; anteocular as long as, or shorter than, postocular portion; both strongly elevated above; postocular subsemiglobular, distinctly detached from neck. Eyes large. Interocular furrow situated behind level of center, not surpassing level of posterior border of eyes. Rostrum bent between first and second segments; first slender, surpassing level of center of eyes; second much shorter than first, slightly swollen; third slender, about as long as first. Antennae relatively short, inserted near apex of head.

Pronotum completely covering mesonotum, deeply constricted before middle. Fore lobe subcircular in dorsal view; hind lobe approximately bell-shaped; disc flattened, faintly depressed longitudinally along middle; humeral angles with 1+1 faint elevations. Scutellum rounded posteriorly, with a median longitudinal ridge on its posterior half; metanotum spined apically. Mesopleura and metapleura separated from sterna by a distinct suture.

Forelegs stout. Coxa very short. Femora with two series of spiniferous processes. Posteroventral series beginning at base of segment, with a large spiniferous process slightly inclined toward base of article; remainder of series composed of medium-sized to short spiniferous processes, apical spine of which is same length as corresponding process if latter is medium-sized, and longer than process if latter is small; extreme apical processes very short, toothlike. Anteroventral series beginning slightly distad of posteroventral series, not interrupted at base, composed of small to very small spines inserted on short, wartlike bases. Fore tibia almost as long as femur, ventrally with one series of straight, strongly sclerotized, inclined spines of virtually uniform size, inserted on very short bases. Fore tarsus about one-sixth as long as tibia, three-segmented, segments of subequal length, weakly chitinized, hairy on all surfaces. Claws subequal in size, outer one with about four small processes on basal half, inner one with a larger submedian projection. Mid and hind legs relatively short and stout, posterior femur hardly surpassing apex of body. Femora and tibia with long, semi-erect setae which do not form groups, and a small number of shorter, perpendicular, delicate hairs. Segments of mid and hind tarsi subequal in size, moderately hairy on all surfaces. Claws slender, curved, ventrally with a medially incised, low lamella.

Forewings wide, narrowly rounded but not emarginated apically, with discal and basal cell. Pcu meeting basal cell at level of apex of cell; a single vein emitted from base of basal cell, attaining axillary region of wing. Pterostigma narrow, not reaching wing tip. Hind wing with hamus meeting Sc+R at a sharp angle, evanescent on basal half. R+M and Cu extending beyond level of cross vein to wing border, simple, not joining; R+M thickened at base.

Abdomen wide, broadly inserted on thorax, highly polished ventrally, with isolated, erect, long hairs. Tergites and sternites lacking projections.

Male: Pygophore slightly compressed laterally, its posteroventral projection elongate, truncate apically. Parameres slender.

Female: Genitalia weakly sclerotized; eighth and ninth tergites subvertical.

TYPE SPECIES: *Schoutedenocoris mirabilis* Villiers (monobasic).

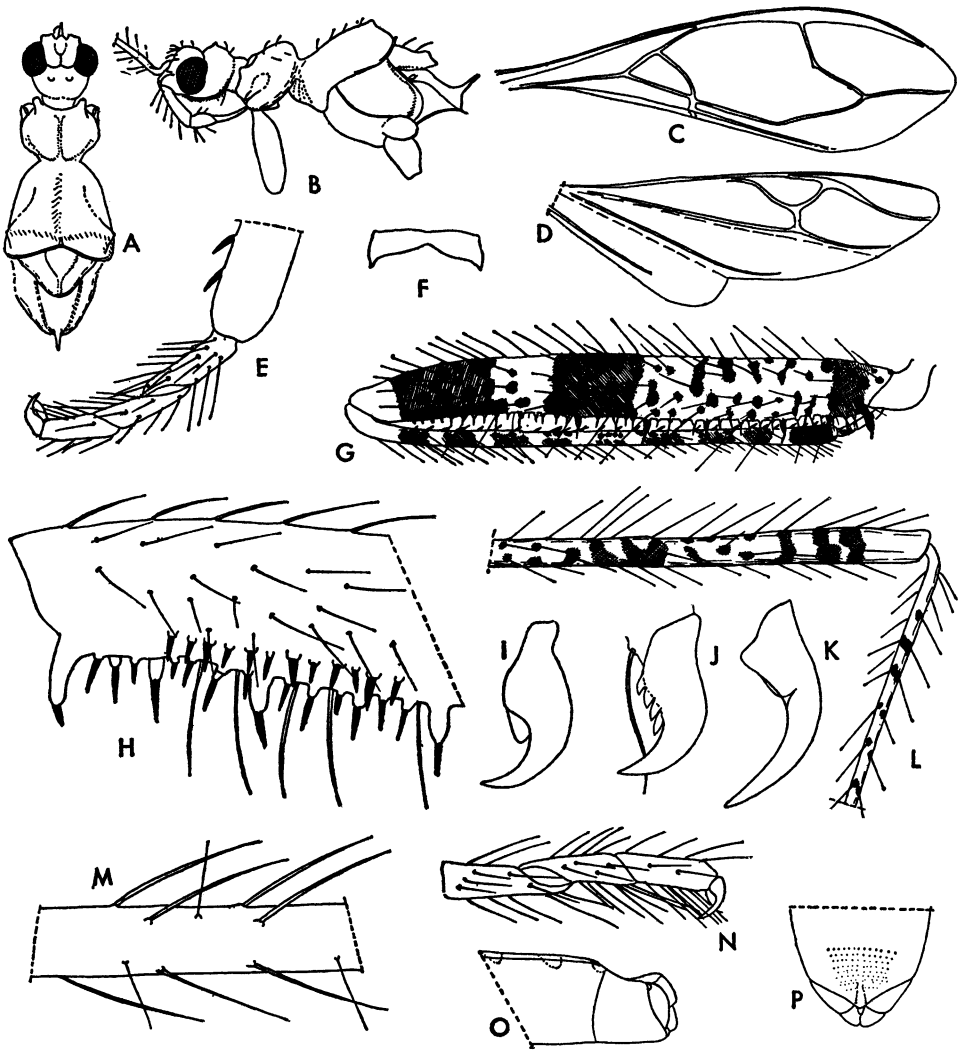


FIG. 92. *Schoutedenocoris mirabilis*, female. A. Head and thorax, seen from above. B. Head and thorax, lateral view. C. Forewing. D. Hind wing. E. Apex of tibia and fore tarsus. F. Posterior border of pronotum, seen from behind. G. Portion of foreleg, with color pattern. H. Base of fore femur. I, J. Claws of foreleg. K. Claw of hind leg. L. Apex of femur and base of tiba of hind leg. M. Portion of posterior femur. N. Hind tarsus. O. Apex of abdomen, lateral view. P. Genital region, seen from below.

DISTRIBUTION: Equatorial Africa.

OBSERVATIONS: Villiers (1961) compared *Schoutedenocoris* to certain ploiarioline genera, but it belongs in the tribe Emesini, as shown by the well-developed spines of the under surface of the fore tibia, the lack of a cross vein connecting the base of the discal cell to the costal margin, and the apical portion of the anal lobe of the hind wing which is not projected into a lobe. It is expected that an examination of the structure of the phallus of *Schoutedenocoris* will bear out the above conclusion.

Villiers (*loc. cit.*) described *Schoutedenocoris mirabilis* as possessing two-segmented fore tarsi. The specimen that I have examined, though extremely similar to *mirabilis*, has three-segmented fore tarsi. Though the possibility cannot be excluded that *Schoutedenocoris* contains otherwise very similar species which differ by the number of the segments of the fore tarsi, this probability

seems remote. For the purpose of the present paper, the genus is considered as having three-segmented fore tarsi.

Schoutedenocoris mirabilis Villiers

Figure 92A–P

Schoutedenocoris mirabilis VILLIERS, 1961, p. 39, figs. 7–10.

The specimen that was used for the illustrations of the present paper agrees well with the original description and figures, with the exception of the fore tarsus (as mentioned above), the truncate projections of the collar (conical in the types), and the fore coxa which is slightly longer than the head (slightly shorter than head in the types). As long as no comparison of actual specimens, especially males, can be carried out, the naming of a new species is not considered advisable.

MATERIAL EXAMINED: Congo (Léopoldville): 33 miles northeast of Tshikapa, August 9, 1957 (E. S. Ross and R. E. Leach; the California Academy of Sciences), one female.

DISTRIBUTION: Ivory Coast; Congo (Léopoldville).

TYPE: Male, Muséum National d'Histoire Naturelle.

STENOLEMIMUS, NEW GENUS

DESCRIPTION: Macropterous male: Small species (8.5–10 mm.).

Body surface highly polished, with isolated short, and numerous long, hairs, latter also present on appendages. Body and appendages with conspicuous pattern elements.

Head short; anteocular slightly shorter than postocular portion; sides of postocular region strongly converging posteriorly in lateral and dorsal views. Eyes large. Interocular furrow situated slightly behind level of center of eyes, not attaining level of posterior border of eyes. Rostrum strongly bent between first and second segments; first long, cylindrical; second shorter than first, slightly swollen only; third slender, about as long as first. Antennae inserted near anterior border of eyes; first segment with numerous long hairs.

Pronotum completely covering mesonotum, shortly pedunculate. Fore lobe short, with sides rounded in dorsal aspect; hind lobe bell-shaped, faintly carinate laterally, humeri with or without spines. Scutellum and metanotum spined or tuberculate posteriorly; first abdominal segment without process.

Forelegs slender. Femur parallel-sided, its ventral surface with two rows of spiniferous processes. Posteroventral series beginning at base of article, composed of several large, regularly spaced processes, basal one larger than any of others, and numerous short ones. Anteroventral series beginning distad of base of posteroventral series, not interrupted at base, composed of several larger and numerous shorter processes. Tibia and tarsus combined as long as femur. Tibia slender, ventrally with one row of strong, sclerotized spines and long, erect bristles. Tarsus about one-eighth as long as tibia, three-segmented, two basal segments subequal in length, third shorter; tarsal segments weakly sclerotized only, hairy on all surfaces. Claws of subequal size; inner one with three narrow processes on basal half, outer one with a large, toothed lamella ventrally. Mid and hind legs elongate; femora with isolated long hairs only. Tarsal segments of mid and hind legs subequal in length; under surface of claws with a medially incised lamella.

Forewings somewhat pointed apically, with a large, basally pointed, discal cell; basal and subbasal cells absent. Only one basally directed vein emitted from base of cell, this vein bifurcate at its base, branches apparently corresponding to M and Cu. Hind wing with hamus meeting Sc+R at a sharp angle; R+M and Cu extending from level of cross vein to wing border, not joining; R+M bifurcate at base.

Abdomen slender, somewhat widened toward posterior third. Last tergite rounded behind, covering genitalia from above. Eighth sternite medium-sized, triangular in lateral view. Pygophore covered in great part by last sternites, exposed portion narrow. Posterior process wide, emarginate apically. Parameres roughly rod-shaped, somewhat curved on apical portion. Phallus symmetrical. Phallosoma subcylindrical, with narrow ventral sclerotization. Endosoma not examined in detail.

TYPE SPECIES: *Stenolemimus cyclops*, new species.

DISTRIBUTION: Oriental and Australian regions.

ETYMOLOGY: *Stenolemus*, a genus of the Emesinae, and *mimus*, imitator.

OBSERVATIONS: The new genus is superficially similar to *Stenolemus*, though it differs by numerous morphological characters, such as the three-segmented anterior tarsi, the basally bifurcate vein near the anterior margin, and the highly polished body surface. *Stenolemimus* is apparently related to *Myiophanes* Reuter, from which it is separated again by the wing venation and the highly polished body surface, as well as by the presence of spines or processes on mesonotum and metanotum.

KEY TO THE SPECIES OF *Stenolemimus*

Scutellum and metanotum with a long spine each (fig. 93B); discal cell of forewing with one large, irregularly shaped, dark spot (fig. 93L) . . . . . *cyclops*

Scutellum and metanotum with a small apical tubercle each (fig. 93R); discal cell of forewing with a large number of small irregular dots (fig. 93T) . . . . . *australis*

Stenolemimus australis, new species

Figure 93R–Z, AA–CC

DESCRIPTION: Male: Length, 10 mm.

General color dark brown, pattern elements white. Head dorsally with a median, longitudinal, white fascia with irregular outlines (fig. 93R); extreme base of neck white, a region behind eyes flavescent at sides. Rostrum with apex of first segment and regions adjacent to limit between second and third segments whitish. Base and apex of first segment of antennae white, region between with six castaneous annuli, alternately very wide and very narrow; base of second segment with a rather narrow annulus, followed by three very wide castaneous annuli, regions between them, and apical white portion, much narrower than dark regions. Color pattern of preserved portions of pronotum as shown in figure 93R; disc of mesonotum and metanotum fuscous, hind borders and apical tubercles whitish. Lateral and ventral surface of thorax fuscous. Pigmentation of forelegs much like that of *cyclops* (see fig. 93E), but with a distinct spot on apex of trochanter, dark annuli of femur wider, and dark pigment also on apical half of second tarsal segment. Pigmentation of mid and hind legs like that of following species. Pattern of forewings as shown in figure 93T, characterized by numerous scattered dots on discal cell and regions beyond it. Abdomen dark; small white areas on basal connexival segments; abdomen ventrally with three median and 4+4 sublateral whitish spots. Genital region dark; parameres whitish, dark at extreme base only.

Body surface highly polished; a few short hairs and numerous long bristles on head, antennae, pronotum, and ventral surface of thorax generally, as well as on ventral surface of abdomen, coxa, femur, and tibia of forelegs, and femora and tibiae of mid and hind legs; not very conspicuous on tibiae of all pairs.

Head and rostrum as shown in figure 93R, S; eyes large, prominent, their distance dorsally considerably greater than their width (3/2), attaining ventral surface of head in lateral view. Length of first segment of antennae, 4.75 mm.; of second, 4.3 mm.; length of hairs on first segment up to seven times, of second segment not more than four times, that of diameter of segment.

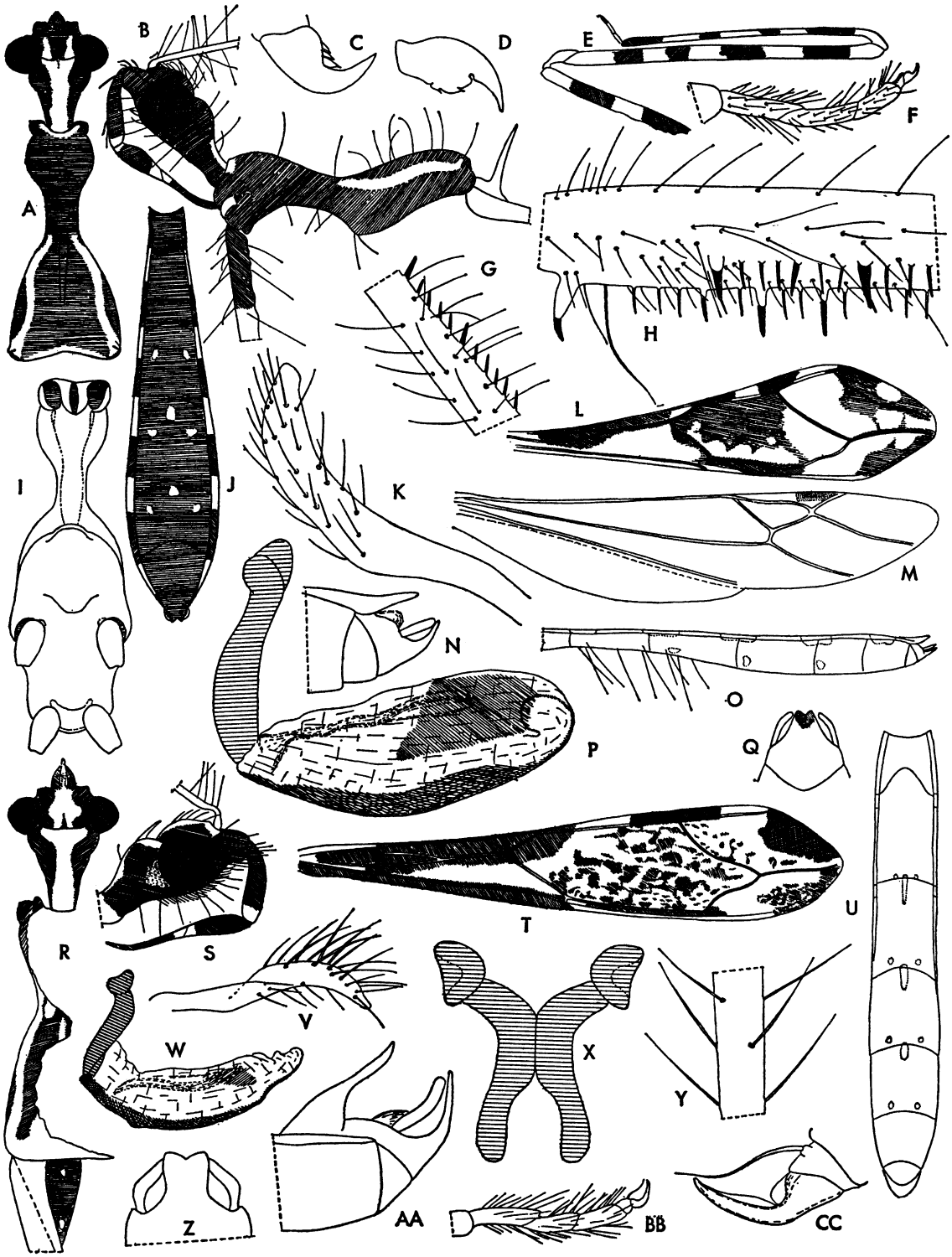
Pronotum approximately as shown in figure 93R; humeral angles clearly without tubercles. Posterior processes of mesonotum and metanotum in form of short tubercles only.

Forelegs slender, their morphology much like that of following species, even as to number of spiniferous processes. Hind legs as given in generic description and shown in figure 93Y, BB, CC,; hind femora surpassing apex of abdomen by about 2.5 mm.

Shape and venation of forewings as shown in figure 93T; hind wings like those of *cyclops* (see fig. 93M).

Abdomen slender, its sides subparallel, only very faintly widened posteriorly (fig. 93U). Genital segments as shown in figure 93AA. Scoop-shaped process of pygophore more elongate than in *cyclops*, almost parallel-sided (fig. 93Z). Shape and chaetotaxy of parameres, shape of basal plates, and general structure of aedeagus as shown in figure 93V–X.

MATERIAL EXAMINED: Australia: New South Wales: Richmond River, February 22, 1923 (V. J. Robinson; United States National Museum), one male holotype, poorly preserved.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC

Stenolemimus cyclops, new species

Figure 93A–Q

DESCRIPTION: Male: Length, 8.5 mm

General color fuscous, pattern elements creamy white. Head dorsally with a wide, median, light-colored, longitudinal stripe on posterior lobe, anterior lobe with 1+1 short stripes at inner border of eyes. Rostrum light-colored on regions immediately adjacent to limits between segments. First segment of antennae with seven whitish annuli, those at apex and base of segment as wide as dark portions, remainder narrower; second segment with three wide, whitish annuli, one subbasal, preceded by a very narrow dark annulus, one somewhat before middle, and one apical; color of remaining segments unknown. Prothorax dark, with exception of anterior half of acetabula, collar, 1+1 lateral stripes of posterior lobe which attain the humeral tubercles, and posterior border. Scutellum and spine whitish; disc of metanotum dark, spine whitish. Ventral and lateral surface of mesothorax and metathorax dark. Pigmentation of forelegs as shown in figure 93E. Coxae and trochantera of mid and hind legs dark, region immediately adjacent to intersegmental limits whitish. Base and apex of femora white, intermediate region with seven brown annuli which are alternately light and dark; intervening white regions as wide as, or narrower than, dark portions. Tibia with a wide, white, basal annulus followed by four equally spaced, brown annuli which occupy two-thirds of article and are much narrower than intervening white portions; intensity of their color decreasing from base to apex of segment. Tarsi light-colored. Pattern of forewings as shown in figure 93L, characterized by large, compact spots; pigmentation of spots along costal margin more intense than that of others. Abdomen dark; connexival segments with alternate white and dark areas subequal in size; ventral surface of abdomen with two median and 3+3 sublateral spots as shown in figure 93J. Genital segment dark; parameres dark on basal two-thirds, whitish on apical third.

Body surface highly polished, with a few short hairs and numerous long bristles on dorsal and ventral surface of head, pronotum, basal half of abdomen ventrally, first and second segments of antennae, coxa, femur and tibia of forelegs, and femora and tibiae of mid and hind legs.

Head and rostrum as shown in figure 93A, B. Eyes very large, prominent, their distance dorsally approximately equal to their width, attaining ventral surface of head at lateral view. Length of first segment of antennae, 3.75; of second, 3.4 mm.; length of hairs of first segment up to eight times, of second segment not more than four times, diameter of segment.

Pronotum as shown in figure 93A, B; humeral angles with 1+1 short tubercles. Mesonotum and metanotum with a large, pointed spine each, both with a few short hairs only; spine of mesonotum erect, of metanotum inclined posteriorly.

Forelegs slender (fig. 93E). Outlines of coxa slightly irregular (fig. 93B). Posteroventral series of femur (fig. 93H) composed of about eight large, and 45 short, spiniferous processes, large basal process largest but with a shorter apical spine than others, slightly inclined toward base of article. Anteroventral series with about 10 large and medium-sized, and 45 small, spiniferous processes. Tibia, tarsus, and claws as given in generic description and shown in figure 93C, D, F, G; tibia ventrally with one row of about 21 large and 50 smaller spines. Mid and hind legs as given

FIG. 93 (OPPOSITE PAGE). A–Q. *Stenolemimus cyclops*, male. A. Head and prothorax, dorsal view, with color pattern. B. Anterior portion of body, lateral view, with color pattern. C, D. Claws of foreleg. E. Foreleg, with color pattern. F. Fore tarsus. G. Portion of fore tibia. H. Base of fore femur. I. Thorax, seen from below. J. Abdomen, ventral view, with color pattern. K. Paramere. L. Forewing, with color pattern. M. Hind wing. N. Genital region, lateral view. O. Abdomen, lateral aspect. P. Phallus, side view. Q. Pygophore, seen from behind. R–Z, AA–CC. *Stenolemimus australis*, male. R. Anterior portion of body, seen from above, with color pattern; prothorax partially destroyed. S. Head, lateral aspect, with color pattern. T. Forewing, with color pattern. U. Abdomen, from below; light-colored spots indicated by stippling. V. Paramere. W. Phallus, lateral view. X. Articulatory apparatus. Y. Portion of posterior femur. Z. Apex of pygophore, seen from behind. AA. Genital region, lateral view. BB. Tarsus of hind leg. CC. Claw of hind leg.

in generic description; posterior femora surpassing apex of body by about 2.5 mm.

Shape and venation of fore and hind wings as given in generic description and shown in figure 93L, M.

Abdomen slender, distinctly widened toward posterior third (fig. 93J, O). Genital region as shown in figure 93J, N, O. Posterior projection of pygophore as shown in figure 93Q. Shape and chaetotaxy of parameres and general structure of phallus as shown in figure 93K, P.

MATERIAL EXAMINED: New Guinea: West New Guinea, Sabron, Cyclops Mountains, May, 1936, 930 feet [L. E. Cheesman; British Museum (Natural History)], one male holotype.

OBSERVATIONS: Some of the differences between the two species of *Stenolemimus* are indicated in the key. The color pattern of the head and thorax and the morphology of the genitalia furnish additional differential characters.

STENOLEMOIDES McATEE AND MALLOCH

Stenolemus (*Stenolemoides*) McATEE AND MALLOCH, 1925, p. 28.

Stenolemoides: WYGODZINSKY, 1947a, p. 514.

DESCRIPTION: Macropterous or brachypterous. Small-sized insects (6.5–9 mm.).

Body surface subshining to dull. Pubescence short, microchaetae and macrochaetae distinct, rarely antennae and some articles of legs with long hairs. Color either uniformly dark, or thorax and legs with conspicuous pattern elements.

Macropterous male: Head with anteocular and postocular portions of subequal length, elevated dorsally, sides of postocular strongly convergent posteriorly, neck distinct. Interocular furrow situated at level of center of eyes, only very slightly backwardly curved. Rostrum strongly bent between first and second segments, both strong, subequal in length, second not swollen; third somewhat longer than second. Antennae inserted near apex of head.

Pronotum completely covering mesonotum, shortly pedunculate, petiole gradually merging with fore and hind lobe. Posterior lobe bell-shaped, lacking humeral or discal projections. Scutellum with a long, metanotum with a short, spine, former subhorizontal.

Forelegs slender. Posteroventral series of fore femur beginning at base of article, composed of large and small spiniferous processes bearing slender apical spines accompanied by elongate, strong setae; larger processes of subequal size, basal one straight or very slightly inclined toward base of article. Anteroventral series beginning slightly apicad of posteroventral series, not interrupted at base, composed of medium-sized and small spines inserted on short bases. Tibia hardly shorter than femur, slender, slightly curved, ventrally with one series of slender, straight spines of two sizes inserted on short bases. Fore tarsus about one-seventh as long as tibia, two-segmented, basal segment shorter than apical, weakly chitinized, hairy on all surfaces. Claws subequal in size, outer one with five to six small, subbasal projections, inner one with medially incised ventral lamella and one or two narrow projections basad of incision. Mid and hind legs medium-sized, hind femur surpassing apex of forewings; femora with microchaetae and scattered macrochaetae. Tarsi of mid and hind legs slender, three segments of subequal size. Claws curved, with a well-developed, medially incised, ventral lamella.

Forewings rather wide, not emarginated apically, with one large discal, and one small basal, cell. Pcu meeting basal cell near apex of cell; a single basad-directed vein emitted from base of basal cell. Pterostigma falling considerably short of wing tip. Cu with a distinct free branch arising from inner border of apical cell; Rs well developed in apical portion of wing. Discal cell with a percurrent, veinlike structure. Surface of forewing corrugate, corrugations often forming short, free, veinlike structures. Hind wings approaching Sc+R gradually, then parallel to, but not fused with, same. R+M and Cu extending from level of cross vein to near wing border; R+M forked, in one case both branches meeting again distally, and branch corresponding to M connected to apical section of Cu by a cross vein, thus two cells in apical half of wing.

Abdomen rather conspicuously widened toward middle; connexival margins entire. Last tergite short, subsemicircular, covering genital region from above. Eighth sternite large. Pygophore subsemicircular in lateral view;

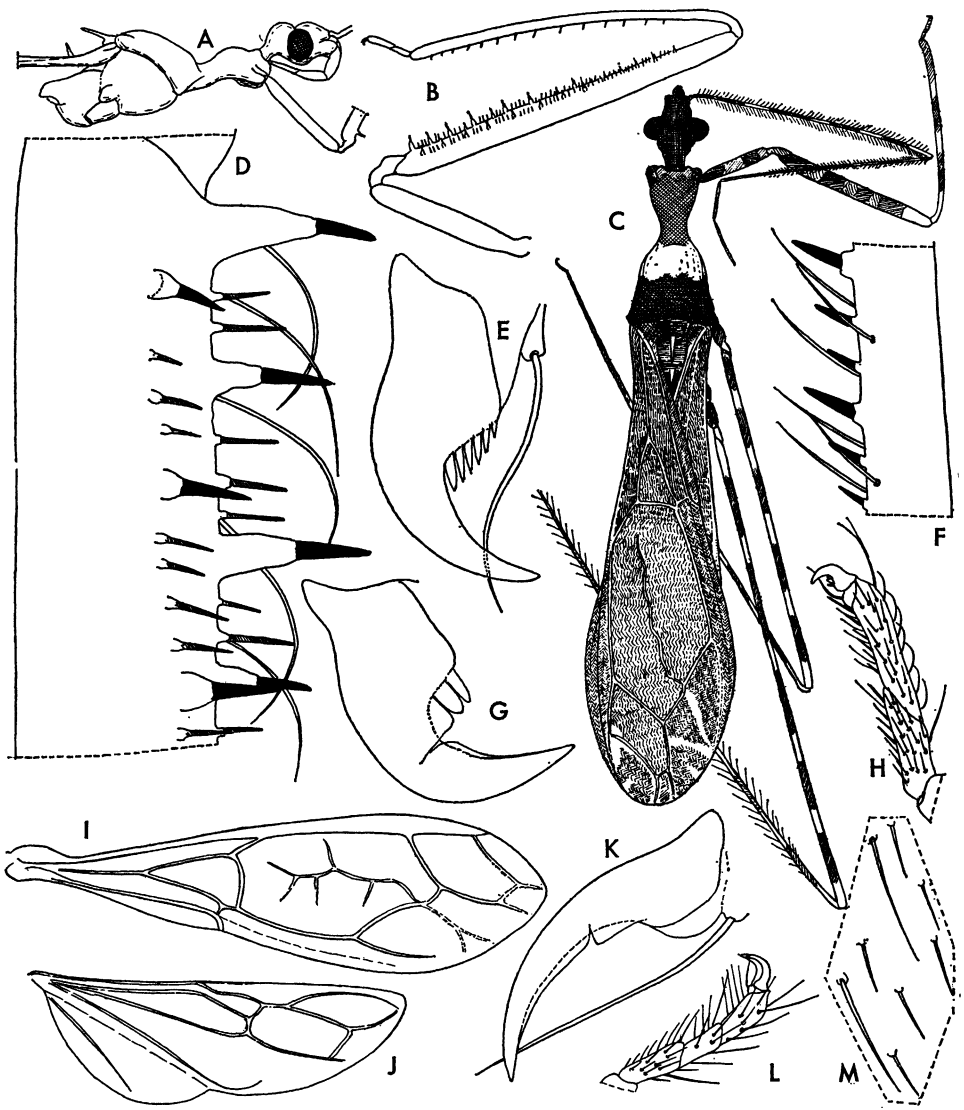


FIG. 94. *Stenolemoides arizonensis*, male. A. Anterior portion of body, lateral view. B. Foreleg. C. General aspect, with color pattern. D. Base of fore femur. E. Outer claw of foreleg. F. Portion of fore tibia. G. Inner claw of foreleg. H. Fore tarsus. I. Forewing. J. Hind wing. K. Claw of hind leg. L. Posterior tarsus. M. Setae of hind femur.

its upper posterior margin straight across, or salient and emarginated. Parameres simple in structure, short, more or less curved apically, with short setae. Phallus symmetrical. Basal plates stout, fused at middle. Phallobase membranous, subcylindrical, with 1+1 basal, and 1+1 apical, membranous lateral expansions. Struts directed toward dorsal wall of phallotheca, fused for part of their length only. Ventral sclerotization of phallotheca well developed. Endosoma (not observed in evaginated state) apparently complex in structure.

Brachypterous female: General characters like those of macropterous male. Hind lobe of pronotum narrowed, not covering sides of mesonotum. Forewings shortened, not surpassing two-thirds of abdomen, but with venation complete. Hind wings developed, attaining apex of forewings, venation com-

plete. Abdomen more strongly widened than in male, strongly chitinized. Seventh sternite large, covering most of gonocoxites. Eighth and ninth tergites strongly chitinized, almost vertical, eighth subsemicircular, ninth subrectangular.

TYPE SPECIES: *Luteva arizonenis* Banks (monobasic).

DISTRIBUTION: Nearctic and Neotropical regions.

OBSERVATIONS: The genus can be divided into two groups, which inhabit discontinuous areas. *Arizonensis* is found in the semiarid zones of the southwestern United States and northwestern Mexico. Two additional species, closely related to each other, inhabit the tropical forests of the southern Brazilian coast ranges. No characters have been found that would cast doubt on the generic assignment of the Brazilian species.

KEY TO THE SPECIES OF *Stenolemoides*

1. Pronotum conspicuously bicolorous, mid and hind legs conspicuously and broadly annulated with dark and light (figs. 94C; 95A) . . . . . *arizonensis*

   Pronotum virtually unicolorous, mid and hind legs dark, with faint and very short, light-colored annuli only (fig. 96C) 2

2. Distance between eyes of male dorsally equal to their width (fig. 96F); hind lobe of pronotum longer than wide (fig. 96F); distal region of forewing marbled with light color at each side of vein emitted from tip of discal cell . . . . . *oliveirai*

   Distance between eyes of male dorsally twice width of eyes (fig. 96C); hind lobe of pronotum not longer than wide (fig. 96C); forewings uniformly dark piceous, only base somewhat lighter (fig. 96C) . . *brasiliensis*

Stenolemoides arizonensis (Nathan Banks)

Plate 3, figure 4; text figures 5I; 11F; 94A–M; 95A–O

Luteva arizonensis: NATHAN BANKS, 1909, p. 45.
Ploiaria arizonensis: VAN DUZEE, 1916, p. 28.
Stenolemus arizonensis: MCATEE AND MALLOCH, 1922, p. 95.
Stenolemus (Stenolemoides) arizonensis: MCATEE AND MALLOCH, 1925, p. 28, figs. 14–16, 18.
Stenolemoides arizonensis: WYGODZINSKY, 1947a, p. 515, figs. 28–33.

For comparative purposes, the male of *arizonensis* is illustrated here in detail.

The female has been unknown until the present. It is brachypterous and apparently incapable of flight. Its main structural features are indicated in the generic diagnosis and are illustrated in figure 95A, J–M. The posterior lobe of the pronotum, in addition to its reduction in size, is further characterized by a well-developed, median, longitudinal carina.

I have seen a very large number of specimens, especially from Arizona and southern California. The following list contains only localities of special interest.

MATERIAL EXAMINED: *United States:* Utah: Toole County: White Rock Spring, Cedar Mountains, May 27, 1954, in rodent burrow (D. M. Allred; collection Usinger), one female. Nevada: Washoe County: Pyramid Lake, at light (W. Ferguson; the American Museum of Natural History), one male. California: Fresno County: 4 miles west of Coalinga, dry bed of Waltham Creek, August 28, 1952 (H. B. Leach and J. W. Green; the California Academy of Sciences), one male. Arizona: Phoenix, October 1, 1940 (the American Museum of Natural History), one female; Pima County: Brown's Canyon, Baboquivari Mountains, July 27, 1948, at light, 3,800 feet (W. Nutting, F. Werner; University of Arizona), one male; Cochise County: Southwestern Research Station, 5 miles southwest of Portal, 5400 feet, May and June (the American Museum of Natural History), numerous males. New Mexico: Dona Ana County: Pyramid Peak (Los Angeles County Museum). Texas: Hudspeth County: 9 miles southwest of Dell City, July 31, 1950 (Ray F. Smith; the American Museum of Natural History), one male; El Paso (University of Kansas), one male; Santa Elena Canyon, Big Bend National Park, April 22, 1953 (B. J. Adelson; collection Ashlock), one male. *Mexico:* Baja California: 45 miles north of San Ignacio, July 27, 1938 (the California Academy of Sciences), one male; 10 miles south of Catavina, July 29, 1938 (the California Academy of Sciences), one male; San Telmo de Arriba, May 3, 1961 (Gertsch and Roth; the American Museum of Natural History), one female; El Rosario, May 5, 1961, under reeds along lagoon (Gertsch and Roth; the American Museum of Natural History), one male. Sonora: 8 miles west of Carbo, October 5, 1959, at light (W. W. Gib-

son; the American Museum of Natural History), two males. Coahuila: Sierra de Tlahualilo, Ojo de Agua, near Durango line, August 15, 1952, 4000 feet (C. C. Karstig; University of Michigan), one male.

DISTRIBUTION: Southwestern United States and northwestern Mexico.

TYPE: Male, Museum of Comparative Zoölogy.

Stenolemoides brasiliensis Wygodzinsky

Figure 96C

Stenolemoides brasiliensis WYGODZINSKY, 1947a, p. 516, figs. 34–56.

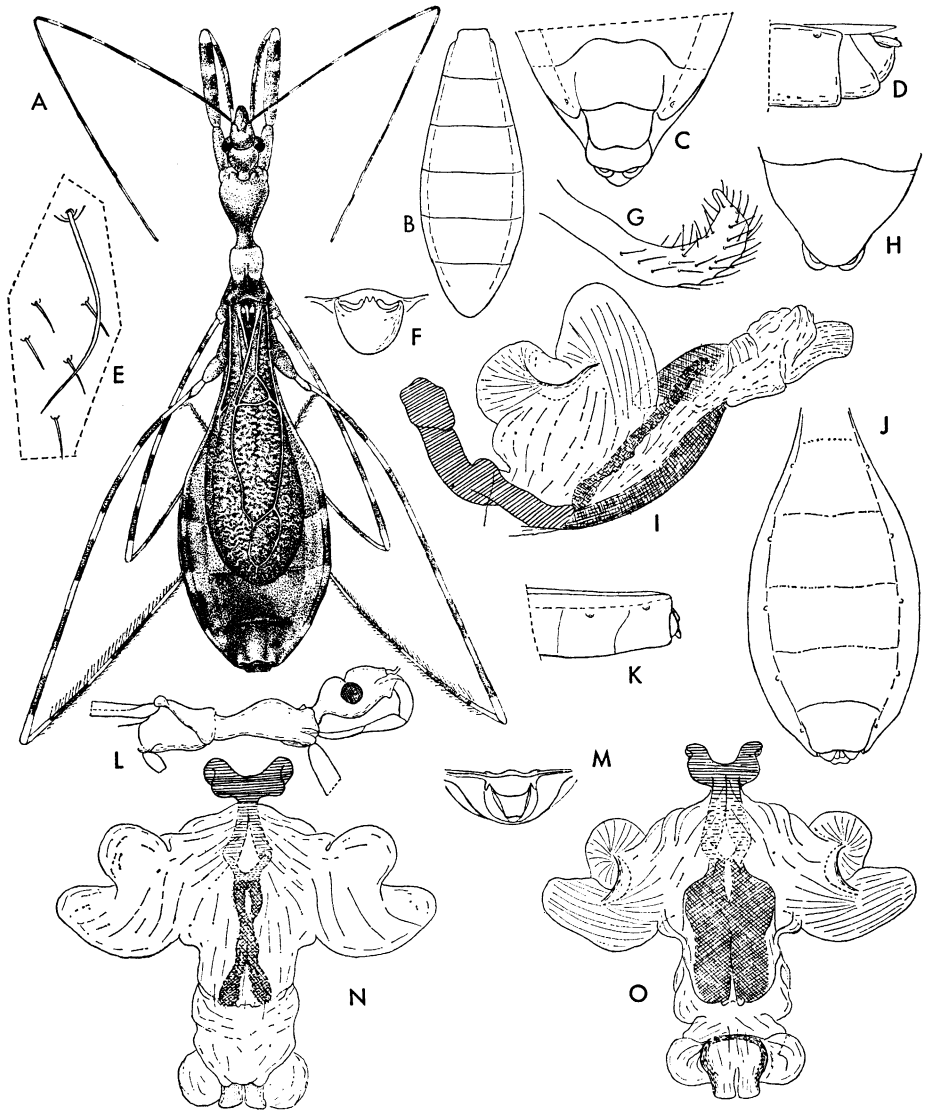


FIG. 95. *Stenolemoides arizonensis*. A. Female, general aspect, with color pattern. B. Abdomen of male, dorsal view. C. Apex of abdomen of male, ventral aspect. D. Genital region of male, lateral view. E. Setae of eighth sternite of male. F. Pygophore, seen from behind. G. Paramere. H. Genital region of male, seen from above. I. Phallus, lateral view. J. Abdomen of female, seen from below. K. Genital region of female, lateral aspect. L. Anterior portion of body of female, side view. M. Genital region of female, seen from behind. N. Phallus, dorsal view. O. Phallus, ventral aspect. (A drawn by Berta Juarez Heredia.)

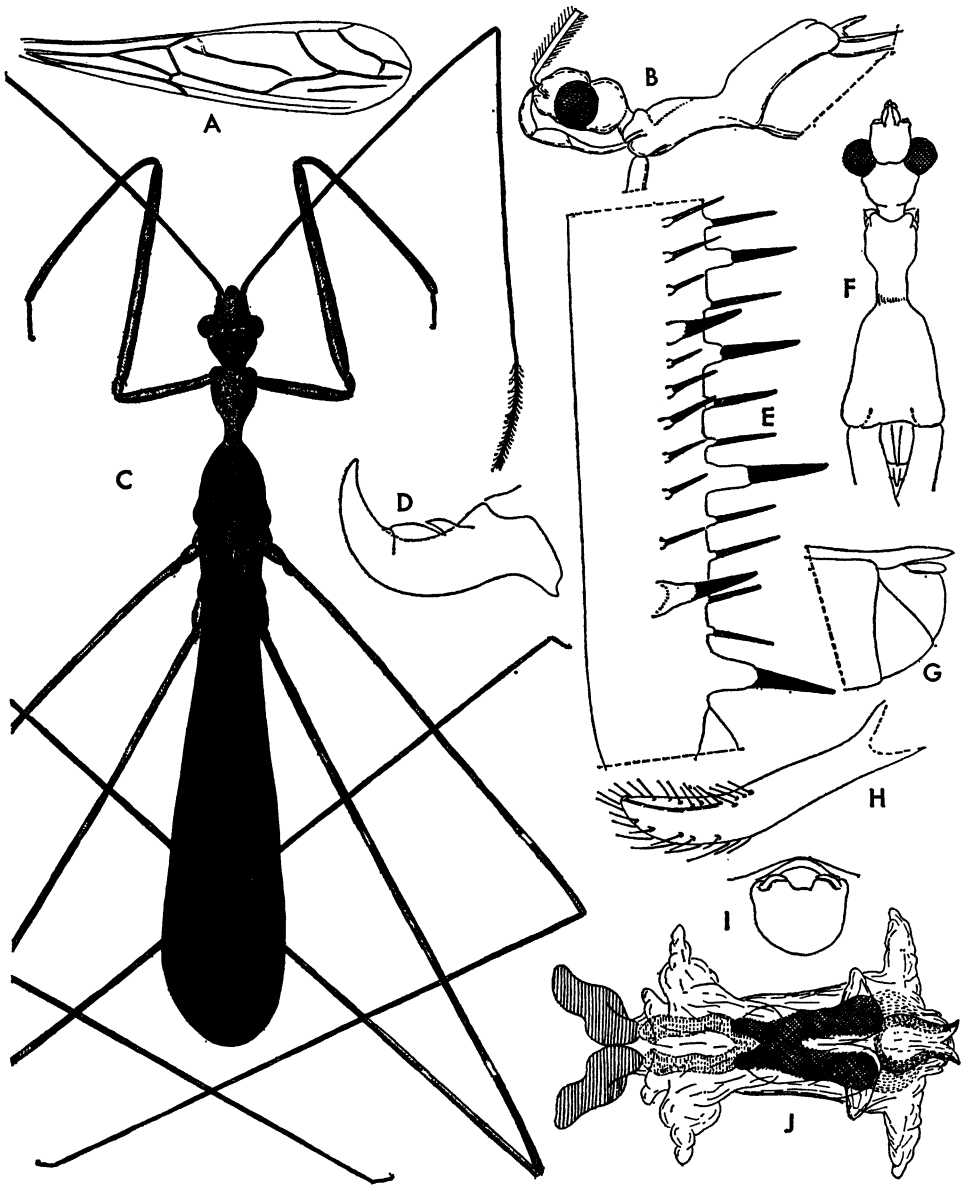


FIG. 96. A, B. *Stenolemoides oliveirai*, male. A. Forewing. B. Anterior portion of body, lateral view. C. *Stenolemoides brasiliensis*, male, general aspect. D–J. *Stenolemoides oliveirai*, male. D. Inner claw of foreleg. E. Base of fore femur. F. Anterior portion of body, dorsal view. G. Genital region, lateral aspect. H. Paramere. I. Pygophore, seen from behind. J. Phallus, ventral aspect.

The general aspect of this insect is illustrated here.

DISTRIBUTION: Brazil (Rio de Janeiro).

TYPE: Male, Instituto de Ecologia e Experimentação Agrícolas.

Stenolemoides oliveirai, new species

Figure 96A, B, D–J

DESCRIPTION: Macropterous male: Length to apex of forewing, 8.5 mm.

General aspect much like that of *S. brasiliensis* (see fig. 96C). General color castaneous; hind lobe of pronotum ferruginous, ochraceous laterally; scutellar and metanotal spines also ochraceous. Fore coxa with a very faint submedian, and fore femur with a distinct subapical, yellowish annulus; mid and hind femora very faintly annulated with yellowish. Veins of forewings ferruginous, space between veins fuscous; apical portion of forewing with 1+1 irregularly whitish spots on each side at level of pterostigma. Abdomen of general color, anterior third of each connexival segment light-colored.

Surface of body subshining, smooth, with short pilosity and isolated long hairs on head, thorax, and abdomen ventrally.

Head and rostrum as shown in figure 96B, F. Eyes large, their distance dorsally equal to their width; attaining level of under surface of head in lateral view. Length of first segment of antennae, 4.5 mm.; relative length of segments, 1/0.75/0.14/?. First segment with numerous hairs almost twice as long as its diameter, remaining segments with short pile only.

Thorax as shown in figure 96B, F; a distinct depression separating petiole from hind lobe. Spine of scutellum twice as long as that of metanotum.

Forelegs slender; their structure like that of *brasiliensis*. Fore femora about 20 times as long as wide. Posteroventral series with about eight large and medium-sized, and about 45 smaller, spiniferous processes; two large basal processes larger than any of remainder. Anteroventral series composed of about 10 medium-sized, and about 50 small, spiniferous tubercles. Ventral series of fore tibia composed of approximately 10 medium-sized and 40 small spines, their structure like that of *arizonensis* (see fig. 94F). Tarsus like that of *arizonensis*, however, medially incised claw with only two projections basad of incision (fig. 96D). Posterior femora surpassing apex of forewing by 2 mm.; tarsus like that of *arizonensis*.

Forewings surpassing apex of abdomen by 1.5 mm.; their shape and venation shown in figure 96A; secondary veinlets like those of *brasiliensis* (see fig. 96C). Hind wings like those of *arizonensis*.

Shape of abdomen like that of *brasiliensis*. Genital region as shown in figure 96G, I; structure and chaetotaxy of parameres, in figure 96H; ventral view of phallus, in figure 96J.

MATERIAL EXAMINED: Brazil: Estado do Rio: Angra dos Reis, Japuhyba, September 25, 1953 (H. S. Lopes and S. J. Oliveira; the American Museum of Natural History), one male holotype.

OBSERVATIONS: This species is named for my friend Dr. Sebastião J. de Oliveira. It is very near to *S. brasiliensis*; the main differences are expressed in the key. It may be added that *brasiliensis* is also smaller than *oliveirai* (6.5 versus 8.5 mm.).

STENOLEMOPSIS, NEW GENUS

DESCRIPTION: Macropterous male: Medium-sized species (slightly more than 10 mm.).

Body surface smooth, slightly shining. Numerous long and slender hairs on body, antennae, and legs. General color brownish, with very conspicuous light and dark pattern elements.

Head moderately elongate, anteocular longer than postocular region, sides of latter strongly but not abruptly converging posteriorly in dorsal and lateral views. Eyes large. Interocular furrow situated slightly before level of center of eyes, transverse. Rostrum strongly bent between first and second segments; first about as long as second, only slightly swollen; third slightly longer than second, slender.

Pronotum completely covering mesonotum, pedunculate; fore lobe gradually narrowing posteriorly, not sharply detached from petiole; hind lobe narrowly bell-shaped, humeral angles salient but lacking projections; lateral carina present. Scutellum and metanotum each with a long spine.

Legs slender. Posteroventral series of femur beginning at or near base of article and composed of strong, spiniferous processes with relatively slender, apical spines. Five largest processes, combined with their spines, about as long as diameter of femur, large basal process not more elongate than any of others. Anteroventral series consisting of similar though somewhat smaller spiniferous processes, beginning almost at same level as posteroventral series, not interrupted at base.

Both series interspersed with long and strong setae. Tibia slender, slightly curved, almost as long as femur, on ventral surface with one series of rather long and slender spines inserted on short processes. Fore tarsus two-segmented, basal segment slightly shorter than second, both weakly chitinized, hairy on all surfaces. Claws subequal in size, outer one with five to six slender, subbasal projections, inner one with medially incised, ventral lamella, two pointed processes basad of incision. Mid and hind legs of moderate length, hind femur slightly surpassing apex of forewings, femora with simple setae of two sizes. Tarsi very short, first and third segments of about identical length, second slightly shorter. Claws slender, curved, with a deep subbasal incision.

Forewings not emarginated apically, with discal, basal, and subbasal cells, the last very small. Pcu meeting basal cell at level of apex of cell. A single, basally directed vein emitted from base of subbasal cell, attaining axillary region. Cu emitting a well-developed branch at level of middle of discal cell; Rs well developed in apical portion of wing, attaining wing tip, connected by a short cross vein to apical portion of M. Discal cell with a percurrent, veinlike fold. Hind wings with hamus approaching Sc+R gradually, fused to same only on basal half. R+M and Cu extending beyond level of cross vein to wing border; R+M bifurcate near its base, distal branch of M connected to apical portion of Cu, thus forming a large cell.

Abdomen rather strongly widened posteriorly, connexival margins slightly undulate on apical half. Seventh tergite tongue-shaped, covering genital region from above. Eighth sternite well developed. Pygophore small, subsemicircular in lateral view, its posterosuperior margin salient and deeply incised at middle. Parameres rather short, slightly curved, with short setae. Phallus symmetrical. Basal plates fused for most of their extension. Phallobase membranous, with 1+1 very large, lateral, bladder-like expansions. Struts directed toward dorsal wall of phallotheca, fused for most of their extension. Ventral sclerotization of phallotheca well developed. Endosoma membranous, not examined in detail.

TYPE SPECIES: *Stenolemopsis leechi*, new species.

ETYMOLOGY: *Stenolemus*, a genus of the Emesinae, and *-opsis*, like.

DISTRIBUTION: Mexico.

OBSERVATIONS: The conspicuous pattern elements and the strongly hairy body make *Stenolemopsis* appear similar to *Stenolemus*, but the different venation, absence of processes on the hind lobe of the pronotum, and other characters are sufficient to separate the two genera. *Stenolemopsis* is very closely related to *Stenolemoides*, as shown, among other characters, by the structure of the male genitalia, but the presence of a subbasal cell (absent from *Stenolemoides*) and the basically different color pattern and presence of long pubescence in *leechi* have led me to erect a new genus for its reception.

Stenolemopsis leechi, new species

Figure 97A–Q

DESCRIPTION: Winged male: Length to apex of forewings, 10.5 mm.

General color luteous. Head piceous before eyes below and at sides, dorsally with a luteous, median, longitudinal line. Rostrum of general body color, first segment whitish apically. Antenniferous tubercles and basal segment of antennae luteous, latter with four relatively narrow, whitish annuli: two submedian, one subapical, and one apical; remaining segments darker brown, second with four white annuli, one subbasal and one apical very narrow, two submedian ones wider. Thorax of general body color, anterior margin of pronotum and tubercles of collar whitish, remaining pattern elements luteous (fig. 97A). Scutellum and metanotum fuscous, their spines whitish. Acetabula whitish, mesopleura with a whitish spot above acetabulum. Forelegs luteous; coxa with a rather wide submedian annulus and a narrow apical annulus whitish; femur with about three very faintly visible, flavescent annuli; tibia with about three equally spaced similar annuli; tarsi very light-colored. Coxae of mid and hind legs luteous, their extreme apex whitish; trochanters whitish; femora luteous, an apical annulus whitish, remainder with about five not very distinct, flavescent annuli which are about as wide as darker areas; tibiae

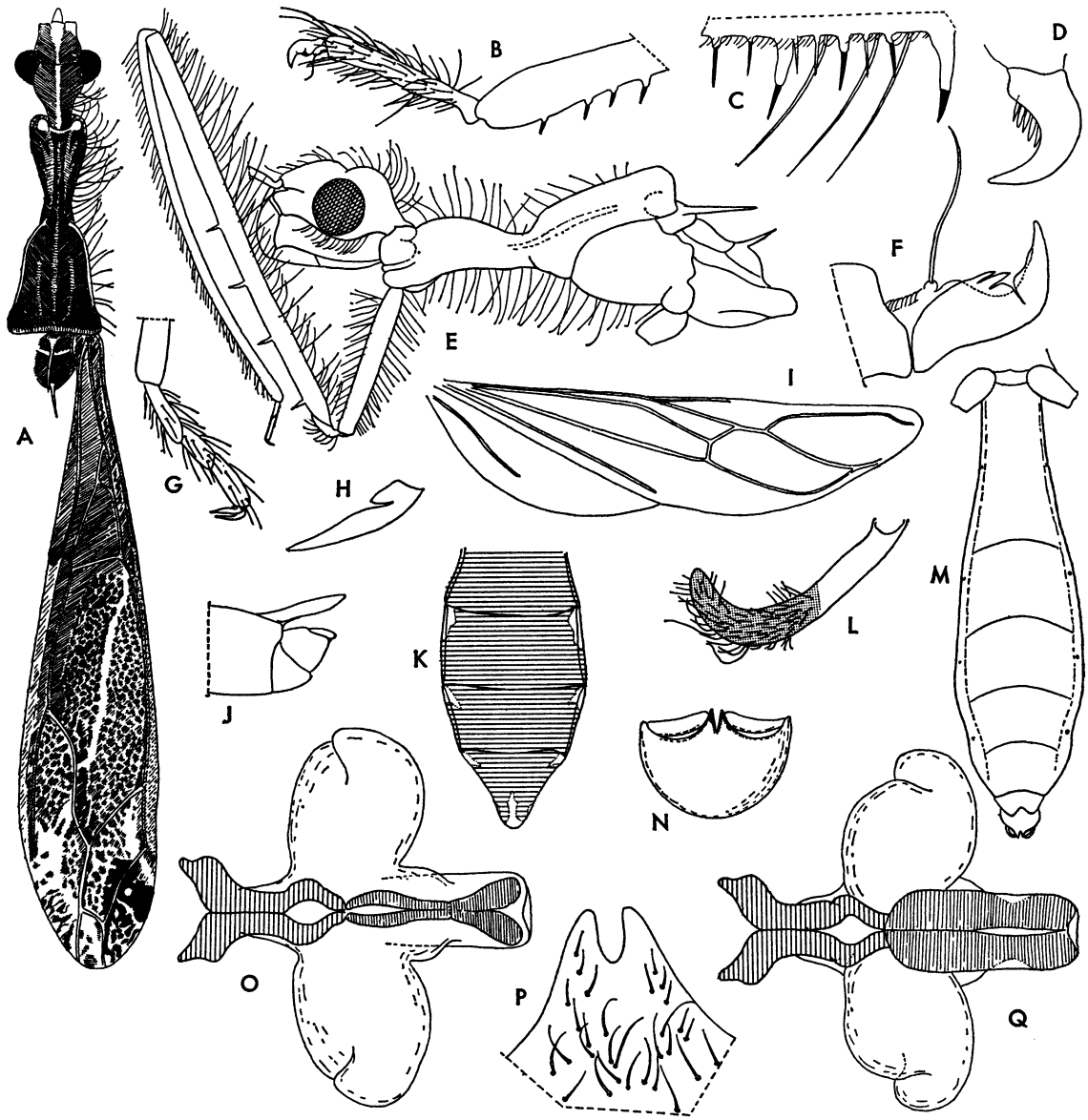


FIG. 97. *Stenolemopsis leechi*, male. A. General aspect, with color pattern. B. Apex of tibia, with fore tarsus. C. Base of posteroventral series of fore femur. D. Outer claw of foreleg. E. Anterior portion of body, side view. F. Praetarsus and inner claw of foreleg. G. Posterior tarsus. H. Claw of hind leg. I. Hind wing. J. Genital region, lateral view. K. Posterior half of abdomen, from above, with color pattern. L. Paramere, with pigmentation shown. M. Abdomen, from below. N. Pygophore, posterior view. O. Phallus, dorsal aspect. P. Posterior process of pygophore, high magnification. Q. Phallus, ventral view.

whitish, with two subbasal piceous annuli which are shorter than distance between them or distance which separates first annulus from base of article. Pattern of forewings as shown in figure 97A; light-colored parts whitish, elements of pattern ochraceous to piceous; pigmentation of veins as illustrated. General color of abdomen piceous, delicately mottled with ochraceous or luteous, more strongly so on dorsal surface; anterior portion of connexival segments luteous; last tergite on apical half with a median longitudinal fascia, stramineous.

Head as shown in figure 97A, E. Eyes large, dorsal interocular distance twice their width; in lateral view almost attaining ventral surface of head. Anterior and posterior lobe strongly convex, transverse furrow deep, hind lobe with a faintly visible, median, longitudinal depression on anterior portion. Rostrum as shown in figure 97E, slightly shining. All segments of antennae with very numerous hairs which are at most twice as long as diameter of segment, first segment furthermore with a moderate number of much longer hairs on dorsal surface. Length of first segment, 4.8 mm.; relative length of segments, 1/0.9/-0.11/0.22.

Prothorax as shown in figure 97A, E. Fore lobe of pronotum combined with petiole slightly shorter than hind lobe, strongly convex above, without longitudinal impression; petiole narrowest shortly before its connection to hind lobe, latter almost flat on disc, its lateral carina evanescent posteriorly. Fore lobe shining, hind lobe dull above, transversely rugose on disc. Spines of scutellum and metanotum inclined posteriorly, straight, pointed apically, with a few short hairs only.

Forelegs as given in generic description and shown in figure 97C, E. Coxa as long as head or fore lobe of pronotum. Femur three times as long as coxa. Posteroventral series composed of about six large processes on which are inserted spines shorter than processes, these processes occupying a little more than basal half of article, and about 20 medium-sized and short tubercles which bear spines much longer than their bases. Anteroventral series beginning at or shortly beyond level of insertion of basal process of posteroventral series, composed of about 45 short to very short tubercles which bear spines much longer than their bases, interspersed with long, strong, straight setae. Tibia nine-tenths as long as femur, spiniferous processes short to very short, numbering about 45. Tarsus and claws as given in generic description and shown in figure 97B, D, F. Mid and hind legs with numerous long hairs which exceed diameter of segment up to four times, uniformly distributed, not forming tufts. Mid femur not attaining, hind femur slightly surpassing, apex of forewings. Length of mid femur, 6 mm.; tibia, 8; hind femur, 9.5; and hind tibia, 12 mm. Tarsi and claws as given in generic description and shown in figure 97G, H.

Forewings surpassing apex of abdomen by 1.5–1.8 mm., their venation as shown in figure 97A. Venation of hind wing as given in generic description and shown in figure 97I.

General characters of abdomen as given in generic description and shown in figure 97K, M. Last tergite irregularly wrinkled transversely on posterior half. Superior border of pygophore with a two-pointed, median projection (fig. 97N, P), more strongly sclerotized at apex. Parameres as shown in figure 97L, N. Phallosoma as shown in figure 97O, Q.

MATERIAL EXAMINED: Mexico: Nayarit: 5 miles south of Río Santiago Ferry, November 27, 1948 (H. B. Leech; the California Academy of Sciences), one male holotype; Morelos: Yautepec, May 4, 1962 (F. D. Parker and L. A. Stange; the American Museum of Natural History), one male; Puebla: Cacaloapan, April 26, 1962 (F. D. Parker and L. A. Stange; University of California, Davis), two males.

OBSERVATIONS: It is a pleasure to name this species for its first collector. No females have been taken; it is imaginable that they are somewhat brachypterous, as in *Stenolemoides arizonensis*, and will not be attracted to light where the above specimens were apparently collected.

STENOLEMUS SIGNORET

Stenolemus SIGNORET, 1858, p. 251.
Phantasmatophanes KIRKALDY, 1908b, p. 369.
Stenolaemus: LETHIERRY AND SEVERIN, 1896, p. 70.

DESCRIPTION: Macropterous. Small to large-sized insects (7–22 mm.), legs often much longer than body.

Body surface dull to shining, in no case highly polished. Pilosity from short and inconspicuous to very long and dense, frequently forming tufts on mid and hind legs. Body invariably with very conspicuous pattern elements, especially on forewings; legs generally annulated.

Head relatively short; anteocular portion equal to, or longer than, postocular, latter often dorsally with 1+1 projections, rather strongly constricted behind eyes, neck invariably distinctly detached from postocular region proper. Eyes from small to large. Interocular furrow situated at level of center of eyes, almost straight. Rostrum strongly bent between first and second segments, latter as long as or shorter than first, from slightly to conspicuously swollen; third very slender, not distinctly longer than second. Antennae short, inserted near apex of head.

Pronotum completely covering mesonotum, pedunculate, very rarely deeply constricted only. Fore lobe subglobular to subquadrangular; petiole from shorter than to many times as long as fore lobe; hind lobe more or less bell-shaped, with 1+1 submedian processes, or with both humeral and submedian processes. Scutellum and metanotum with one long spine each.

Forelegs moderately slender. Femora with two series of spiniferous processes. Posteroventral series beginning at base of article, with a large, spiniferous process very frequently inclined toward base of article; remainder of series composed of large, medium-sized, and small, spiniferous processes, apical spine of which is much shorter than process if latter is large, as long as or longer than process if latter is short; processes and spines not transformed apically into short teeth. Anteroventral series beginning slightly distad of base of posteroventral series, not interrupted at base, composed of medium-sized and small processes much like those of posteroventral series. Fore tibia from slightly more than one-half of to almost as long as femur, ventrally with two series of straight spines of virtually uniform size inserted on short bases. Fore tarsus two-segmented, basal segment about half as long as second; both combined about one-fifth as long as tibia, weakly sclerotized, hairy on all surfaces; claws subequal in size, outer one with four to five slender subbasal processes, inner one with a large, peculiarly indented lamelliform salience on basal half. Mid and hind legs often with very numerous long hairs or with short or medium-sized hairs forming more or less conspicuous tufts on dark areas of femora and tibiae. Segments of tarsi of mid and hind legs subequal in size, moderately hairy on all surfaces; last segment with a few short spines apically below. Claws relatively short, curved, ventrally with a medially incised lamella.

Forewings often considerably surpassing apex of abdomen, more or less widened, apical portion of inner margin frequently emarginated. Discal and basal cell present; former in some cases subdivided longitudinally by an accessory vein. Single vein emitted from base of basal cell toward axillary region; a short, in some cases incomplete, vein connecting outer border of basal cell to costal margin. Pcu meeting basal cell at various levels. Pterostigma very narrow, not attaining wing tip. In hind wing, hamus approaching Sc+R only gradually, becoming fused to latter basally or not. R+M and Cu extending beyond level of cross vein to wing border; R+M forked at base, branches meeting again at apex; in some cases apical section of Cu connecting to distal branch of M by a cross vein.

Abdomen varied in shape, from very slender, almost parallel-sided, to racket-shaped; connexival segments in some cases salient to lobate; in American species in some cases ventral and occasionally also dorsal surface of abdomen with paired processes; spiracles often conical, conspicuous. Sternites and tergites with microchaetae and macrochaetae.

Male: Seventh tergite subsemicircular or tongue-shaped apically, covering genital region from above. Eighth sternite almost as long ventrally as pygophore; latter more or less subsemicircular in lateral view, its posterior border with a broad, platelike process more or less emarginated or bifid apically. Parameres slender, bent and pointed apically, their setae long and slender. Phallus symmetrical, small. Basal plates fused for almost their whole length. Phallotheca membranous, lacking projections; phallotheca wall with longitudinal ventral, and very conspicuous dorsal, platelike sclerotization; struts directed toward dorsal surface of phallotheca, fused for almost their whole length, resulting

sclerite widened and incised apically. Endosoma apparently simple in structure, lacking sclerotized projections.

Female: Genitalia simple, with distinct macrochaetae and microchaetae. Syngonapophysis subsemicircular in outline.

TYPE SPECIES: Of *Stenolemus*, *Stenolemus spiniventris* Signoret (monobasic); of *Phantasmatophanes*, *Phantasmatophanes muiri* Kirkaldy (monobasic).

DISTRIBUTION: The genus occurs in all zoogeographical regions, with native species. No cosmopolitan species is known.

OBSERVATIONS: It has not been possible to find any character that would allow a rational subdivision of the genus. The different species groups, such as that around the type of *Phantasmatophanes*, *muiri*, with very elongate tufted mid and hind legs, or certain New World groups characterized by pairs of ventral or, in some cases also dorsal, processes or tufts on the legs, and various others are more or less connected by annectant forms. Furthermore, they share apomorphic characters such as the peculiar wing venation, the typical structure of the forelegs, and the unique male genitalia, virtually identical in many otherwise quite distinctive species that were examined. The different species groups mentioned above probably represent different evolutionary lines. A critical revision of the genus on a world-wide basis is necessary for an interpretation of these trends.

As I am not acquainted with many of the described species, and as available descriptions do not in every case contain all desirable information, it has not been possible to prepare a key for the genus on a worldwide basis. It is hoped that the regional keys presented below will prove of some assistance for identification.

KEY TO THE NEW WORLD SPECIES OF *Stenolemus*

1. Prothorax deeply constricted but not pedunculate (fig. 99C) 2
   Prothorax distinctly pedunculate (figs. 99B; 100A, D) 3
2. Fore femur with first strong spiniferous process directed straight downward, not angling toward base of femur; hind lobe of pronotum with four distinct tubercles near hind margin; fore tibia very short and stout, distinctly shorter than femur and much less than twice as long as coxa . *longicornis*
   Fore femur with first large spiniferous process angling toward base of femur; disc of hind lobe of pronotum without tubercles; fore tibia slender, little shorter than femur and about twice as long as coxa . *pallidipennis*
3. Abdominal sternites lacking submedian processes 4
   Abdominal sternites with submedian processes (fig. 99L) 14
4. Apical discal cell of forewings divided by a distinct longitudinal vein (fig. 100B, C) . 5
   Apical discal cell entire (fig. 100A) 9
5. Petiole of pronotum longer than fore lobe; pattern of forewing as shown in figure 100E . . . . . *apiguassu*
   Petiole of pronotum not longer than fore lobe 6
6. Dark annuli of mid and hind femora accompanied by conspicuous tufts of concolorous hairs (fig. 100D) 7
   Dark regions of mid and hind femora with hairs concolorous but not forming tufts (as shown in fig. 100A); pattern of forewings as shown in figure 100B, C 8
7. Posterior femur with only one tuft piceous, remainder light brown; general color of forewings whitish, extention of dark pattern elements very reduced . . . *schwarzii*
   Several of tufts of posterior femur piceous; general color of forewings dark brown, light-colored areas very reduced in extension (fig. 100D) . . . . . *plaumanni*
8. Petiole of pronotum much shorter than fore lobe (fig. 99A); pattern of forewing as shown in figure 100B . . . . . *dureti*
   Petiole not shorter than fore lobe of pronotum; pattern of forewing as shown in figure 100C . . . . . *calilegua*
9. Spines of scutellum and metanotum strongly thickened apically; forewings dark, with numerous radiating white stripes (pl. 2, fig. 6) . . . . . *minensis*
   Spines of scutellum and metanotum slender, not thickened apically; pattern of forewings different 10
10. Discal cell of forewing with small, central, yellow, ameboid spot (fig. 100A) . *vianai*
    Discal cell of forewing lacking said spot . . 11
11. Forewings dark, reticulated with very numerous white, veinlet-like lines . . *saileri*
    Forewings different 12
12. Postocular region of head lacking dorsal tubercles; first large spiniferous process of fore femur much larger than any of remainder (fig. 99I); pattern of forewing composed of well-defined spots (fig. 100H); short vein originating from inner margin of

basal cell closer to base than to apex of cell (fig. 100H) . . . . . *huali*

Postocular region of head dorsally with 1+1 small but distinct tubercles; large basal spiniferous process of fore femur not distinctly larger than any of remainder; pattern of forewings diffuse; short vein originating from inner margin of basal cell situated closer to apex than to base of cell 13

13. Humeral processes of pronotum spiniform, elongate, conspicuous . . . . . .*zikani*

Humeral processes of pronotum not very evident, short, not elongated apically . . . . . *anduzei*

14. Discal cell subdivided longitudinally by a distinct vein 15

Discal cell entire 16

15. Dark annuli of hind femora as wide as light-colored ones; hairs accompanying dark annuli uniformly brown; sixth tergite lacking submedian processes . . . . . .*lanipes*

Light-colored portions of hind femora much wider than dark annuli; hairs of basal dark annuli blackish, those of apical ones light brown; sixth tergite with 1+1 submedian processes . . . . . *mexicanus*

16. Posterolateral angles of dorsal connexival segments with large, foliaceous appendages; fourth, fifth, and sixth abdominal tergites with 1+1 submedian, spiniform processes . . . . . .*lenti*

Connexival segments without large foliaceous processes; posterior abdominal tergites with at most two pairs of spiniform processes 17

17. Submedian projections of posterior lobe of pronotum extraordinarily developed, very much larger than humeral processes (fig. 99B); fifth and sixth tergites with 1+1 submedian, spiniform processes (fig. 100I) . . . . . .*mirabilis*

Submedian projections of hind lobe of pronotum of normal size, not conspicuously larger than humeral processes; last abdominal tergites either with or without a single pair of processes 18

18. Discal cell dark, with central, yellowish, ameboid spot (much as shown in fig. 100A) 19

Discal cell differently colored 24

19. Short vein originating on inner margin of basal cell situated at level of apex of said cell . . . . . *interstitialis*

Short vein originating on inner margin of basal cell basad of level of apex of cell .20

20. Abdomen ventrally with one or two pairs of processes 21

Abdomen ventrally with three pairs of processes 22

21. Abdomen ventrally with two pairs of processes . . . . . *variatus*

Abdomen ventrally with a single pair of processes . . . . . *decarloi* var.

22. Basal cell of forewings with yellowish ameboid spot; dark annuli of mid and hind femora wider than, or about as wide as, intervening light-colored portions . . . . . *wygodzinskyi*

Basal cell of forewings lacking yellowish ameboid spot; dark annuli of mid and hind femora much narrower than intervening light-colored portions 23

23. Projections of posterior portion of pronotum very short, conical; fore femur with only two large spiniferous processes, basal one much larger than second . . . .*perplexus*

Projections of hind border of pronotum more elongate, spinelike; fore femur with four or five large, spiniferous processes, basal one not distinctly larger than any of remainder . . . . . *decarloi*

24. Dark annuli of mid and hind legs accompanied by numerous short, concolorous hairs . .25

Dark annuli of mid and hind legs not accompanied by especially numerous short, concolorous hairs 26

25. Petiole about as long as anterior portion of pronotum; fore lobe, petiole, and hind lobe brown, with faint pattern elements; pattern of forewings composed of irregular and somewhat diffuse spots . . . . . .*carioca*

Petiole of pronotum much longer than fore lobe; petiole and fore lobe piceous, hind lobe whitish; pattern of forewings composed of sharply delimited spots and stripes, basal region and cells characterized by transverse white bands . . . . . .*sarampiuni*

26. Petiole distinctly longer than fore lobe of pronotum; light-colored portions of forewing peppered with small, dark spots (fig. 100G); short vein originating from inner border of basal cell inserted almost at level of apex of cell (fig. 100G). . . . *teffeanus*

Petiole not distinctly longer than fore lobe of pronotum; pattern of forewing different; insertion of small vein originating from inner border of basal cell remote from level of apex of cell 27

27. Processes of scutellum and metanotum slender, with a few hairs only; projections of hind lobe of pronotum very short, almost pointed apically; disc of hind lobe peppered with numerous small, dark spots; forewings piceous, reticulated with very numerous, white, veinlet-like lines . *saileri*

Processes of scutellum and metanotum distinctly thickened apically, with very dense, long pilosity; projections of hind lobe large, rounded-truncate apically; color of hind lobe light brown, without spots; wings whitish, with brownish spots, but without veinlet-like lines . . . . . *.spiniventris*

KEY TO ORIENTAL AND AUSTRALIAN SPECIES OF *Stenolemus*

1. Some of dark annuli of mid and hind legs beset with a large number of concolorous hairs which form more or less conspicuous tufts (fig. 98A) 2
   Darkly pigmented annuli of mid and hind legs with hairs not more numerous than on rest of surface of legs (fig. 98M) 9
2. Pronotum not especially elongate, petiole shorter than hind lobe; forewings about twice as long as head and pronotum combined 3
   Pronotum very elongate; petiole as long as or longer than hind lobe (fig. 98A); forewings much less than twice as long as head and pronotum combined (fig. 98A) 4
3. First spiniferous process of fore femur slightly but distinctly longer than any of remainder . . . . . *.edwardsii*
   Third or fourth large, spiniferous process of fore femur longer than first or any of others . . . . . *papuensis*
4. Femora of second pair with three, of third pair with four, dark tufts (fig. 98A) . . 5
   Dark tufts of mid and hind femora fewer in number 7
5. All dark tufts of mid and hind femora of identical dark brown color; tibiae of mid and hind pair with three bristle tufts, a basal white, a subbasal light brown, and a submedian dark brown one . . . . *muiri*
   Median tuft on femur of second and penultimate tuft on femur of third pair light brown, others dark brown; mid and hind tibiae with one subbasal bristle tuft only, its color dark brown (fig. 98A) 6
6. Second segment of rostrum very strongly swollen, almost as high as long in lateral view (fig. 98G); whitish regions of abdomen slightly more extensive than dark ones; dark portions of forewing more extensive than is shown in figure 98A . . . *.eucnemus*
   Second segment of rostrum only slightly swollen (fig. 98B); dark portions of abdomen much more extensive than whitish ones; extension of dark portions of pattern of forewings as shown in figure 98A . . *.larat*
7. Legs with a large number of very long, silky, downlike hairs (pl. 3, fig. 2); forewings white, with normally extended dark pattern; hind wings mainly white . *.fasciculatus*
   Mid and hind legs with very sparse long hairs only, in addition to tufts; forewings with dark pattern elements covering most of surface; hind wings almost entirely dark brown 8
8. Petiole of pronotum longer than hind lobe; femora of second pair without, of third pair with, two annular tufts of dark hairs. Petiole of pronotum dorsally, processes of hind lobe, and spine of scutellum mainly whitish; spiniferous processes of fore femora whitish; articulation of hind femora and tibiae broadly white . . . . . *.plumosus*
   Petiole of pronotum not longer than hind lobe; femur of second pair with one dorsal (fig. 98 O), of third pair with one annular and one dorsal, tuft of dark hairs. Petiole of pronotum dorsally, processes of hind lobe, scutellar spine, and spiniferous processes of fore femora dark brown; articulation of posterior femora and tibiae brown *.facetus*
9. Petiole more than six times as long as anterior portion of pronotum (fig. 98F) . *.giraffa*
   Petiole at most three times as long as anterior portion of pronotum (fig. 98M) . .10
10. Pattern of forewings composed exclusively of longitudinal stripes (fig. 98M) . . . . . *susainathani*
    Pattern of forewings different 11
11. Hind wings dark brown; basal and discal cell of forewings uniformly dark brown, with veinlike, light brown reticulations; petiole almost three times as long as fore lobe of pronotum; hind lobe with four distinct, though short, tubercles . . *quadriannulatus*
    Hind wings mainly light-colored; basal and discal cells of forewings whitish, with dark spots; petiole not more than twice as long as fore lobe of pronotum 12
12. Petiole considerably shorter than anterior lobe of pronotum . . . . . *.crassirostris*
    Petiole not shorter than anterior lobe of pronotum 13
13. Petiole of pronotum distinctly longer than fore lobe 14
    Petiole of pronotum about as long as fore lobe 15
14. Fore coxa dark brown on basal four-fifths, apex whitish . . . . . *.bituberus*
    Fore coxa whitish, with one subbasal and one subapical brown annulus . . . *bispinosus*
15. Length of insect, less than 10 mm.; inner margin of apical portion of forewings with pigment spot 16
    Length, somewhat more than 10 mm.; inner margin of apical portion of forewing lacking

pigment spot . . . . . *atkinsoni*

16. Pattern of forewing composed of "large brown spots, of which the largest two are discal, one apical and angular, a smaller spot at inner angle and a few very small and nebulous in apical area" (Distant, 1903b) . . . . . *greeni*

Pattern of forewings composed of one large spot in apical discal cell, one group of spots at inner margin of apical portion of wing, and one large, well-defined spot on outer margin, from apex of wing to near insertion of M on corium (fig. 98J) . . . *fraterculus*

Stenolemus hirtipes Distant (India) is not included in the key.

Key to Palearctic and Ethiopian Species of *Stenolemus*

1. Petiole shorter than fore lobe of pronotum 2

Petiole as long as, or longer than, fore lobe of pronotum 7

2. Fore lobe of pronotum transverse or subquadrate, wider than long. 3

Fore lobe of pronotum subglobular, not wider than long 5

3. Eyes wider than half of dorsal interocular distance; petiole only slightly shorter than fore lobe of pronotum; apex of forewings with faint brown spots . . . . *dakarensis*

Eyes less than half as wide as dorsal interocular distance; petiole considerably shorter than fore lobe of pronotum; apex of forewing with large black spots 4

4. Fore lobe of pronotum subquadrate; basal cell of forewing with a very small black spot; posterior lobe of head lacking median longitudinal sulcus; second rostral segment about half as long as first . . . *grandidieri*

Fore lobe of pronotum rounded behind; basal cell of forewings lacking black spot; posterior lobe of head with median longitudinal sulcus; second rostral segment only slightly shorter than first . . . . . *marlieri*

5. Postocular portion of head with 1+1 conical protuberances; eyes very large, about half as wide as dorsal interocular space, processes of hind lobe of pronotum conical, relatively small but distinct . . . . *brevis*

Posterior lobe ot head lacking protuberances; eyes small, distinctly less than half as wide as dorsal interocular space; projections of hind lobe of pronotum almost indistinguishable. 6

6. First segment of antennae more than half as long as fore femur; posterolateral angle of fifth and sixth connexival segments spine-like; apical area of forewings beyond cell mainly whitish . . . . . *novaki*

First segment of antennae less than half as long as fore femur; posterolateral angles of connexival segment not projecting; apical area of forewing beyond cell extensively darkened . . . . . *kabylinus*

7. Petiole twice to three times as long as fore lobe of pronotum; size to apex of forewing, 13–14 mm. 8

Petiole less than twice length of fore lobe of pronotum; size, less than 13 mm. (but 15 mm. in *ornatus shinyanga*) 9

8. Head and appendages with moderate number of hairs but not plumose; petiole of pronotum about three times as long as fore lobe; outline of abdomen continuous; legs annulated with black. . . . *macrostylus*

Head and appendages with large number of hairs, plumose; petiole of pronotum about twice as long as fore lobe; connexival angles of abdomen salient; legs annulated with fuscous . . . . . *bogdanovii*

9. Processes of hind lobe of pronotum very large, rounded or truncate apically 10

Processes of hind lobe of pronotum, if present at all, small, conical, pointed apically. . 12

10. Processes of hind lobe of pronotum flattened above, outwardly curved . . . . *iturianus*

Processes of hind lobe of pronotum broadly rounded apically, not outwardly curved . 11

11. Hind lobe of head semicircular, its sides regularly rounded . . . . . *marshalli*

Hind lobe of head narrowed posteriorly, its sides strongly convergent . . . . *gerardi*

12. Hind lobe of pronotum with a median longitudinal depression limited by two carinae. 13

Hind lobe of pronotum without median depression or carinae. 16

13. Carinae of hind lobe of pronotum prolonged beyond tubercles; basal cell of forewings with dark spot or spots. 14

Carinae of hind lobe of pronotum not prolonged beyond tubercles; basal discal cell lacking spots 15

14. Size, less than 10 mm. . . . . *ornatus*

Size, 15 mm. . . . . *ornatus shinyanga*

15. Length, 9 mm.; vein limiting basal cell of forewings inclined in relation to costal margin . . . . . *villiersi*

Length, 7.5 mm.; vein limiting basal discal cell perpendicular in relation to costal margin . . . . . *haoussa*

16. Head longer than wide across eyes; length of insect, more than 10 mm. . . . . *madagascariensis*

Head not so long as wide across eyes; length of insect, less than 10 mm. . . . . *laticeps*

A key for the African species of *Stenolemus*, including those from North Africa and Madagascar, can be found in Villiers (1961), and one for European and North African species in Dispons and Stichel (1959). *Stenolemus monodi* could not be included in my key because of insufficient data.

Stenolemus anduzei Wygodzinsky

Stenolemus anduzei WYGODZINSKY, 1947b, p. 131, figs. 7–11.

MATERIAL EXAMINED: Ecuador: intercepted in bananas at Charleston (United States National Museum), one male.

DISTRIBUTION: Venezuela; Ecuador.

TYPE: Female, Instituto Nacional de Higiene, Caracas.

Stenolemus apiguassu Wygodzinsky and Abalos

Figure 100E

Stenolemus apiguassú WYGODZINSKY AND ABALOS, 1950, p. 101, figs. 2A, 2B, 3B, 4A.

The pattern of the forewing is illustrated here.

DISTRIBUTION: Brazil (Pará).

TYPE: Male, Naturhistorisches Museum, Vienna.

Stenolemus atkinsoni Distant

Stenolaemus atkinsoni DISTANT, 1903b, p. 256.

DISTRIBUTION: India (Northwest Provinces).

TYPE: British Museum (Natural History).

Stenolemus bispinosus (Westwood)

Ploiaria bispinosa WESTWOOD, 1846, p. 65.

Stenolaenus (sic) bispinosus BERGROTH, 1887, p. 18.

MATERIAL EXAMINED: Australia: Arrona Spring, near Copley, November 29, 1951 (Gross; the American Museum of Natural History), one male; Tennants Creek (J. F. Field; South Australian Museum), three specimens.

DISTRIBUTION: Australia.

TYPE: British Museum (Natural History).

Stenolemus bituberus Stål

Figure 98T

Stenolemus bituberus STÅL, 1874, p. 94.

MATERIAL EXAMINED: Australia: South Australia (the Reverend A. P. Burgess; South Australian Museum), one specimen; Swan River (South Australian Museum), one female; Mindaria (the American Museum of Natural History), one male. Western Australia: Beverly (F. H. du Boulay; South Australian Museum), two males; Mullewa (Miss F. May; South Australian Museum), two males.

DISTRIBUTION: Australia.

TYPE: Naturhistoriska Riksmuseet.

Stenolemus bogdanovii Oshanin

Stenolemus bogdanovii OSHANIN, 1870, p. 208.

Stenolaemus bogdanovii: HORVÁTH, 1922, p. 105, figs. 3, 4.

DISTRIBUTION: Southern Russia; Syria; Israel; Iran.

TYPE: Unknown.

Stenolemus brevis Villiers

Stenolaemus brevis VILLIERS, 1949a, p. 303, figs. 102–109, 115, 123.

DISTRIBUTION: French Somaliland.

TYPE: Male, Muséum National d'Histoire Naturelle.

Stenolemus calilegua Wygodzinsky and Abalos

Figure 100C

Stenolemus calilegua WYGODZINSKY AND ABALOS, 1950, p. 103, figs. 2G, 2H, 3C, 4B.

The forewing is illustrated here.

DISTRIBUTION: Argentina (Jujuy).

TYPE: Female, Instituto Miguel Lillo.

Stenolemus carioca Wygodzinsky

Stenolemus carioca WYGODZINSKY, 1945c, p. 258, figs. 46–50.

DISTRIBUTION: Brazil (Rio de Janeiro).

TYPE: Female, Museu Nacional.

Stenolemus crassirostris Stål

Stenolemus crassirostris STÅL, 1871, p. 702.

MATERIAL EXAMINED: Philippines: Alabang, May 17, 1930 (the California Academy of Sciences), one female.

DISTRIBUTION: Philippines; Ceylon.

TYPE: Museum Zoologicum Universitatis.

Stenolemus dakarensis Villiers

Stenolaemus dakarensis VILLIERS, 1957b, p. 272.

DISTRIBUTION: Senegal.

TYPE: Institut Français d'Afrique Noire.

Stenolemus decarloi Wygodzinsky

Figures 6E; 99T–V; 100F

Stenolemus decarloi WYGODZINSKY, 1947b, p. 137, figs. 18–23.

The pairs of processes of the ventral abdominal surface vary somewhat in number. Normally, they are well developed and there are three pairs (fig. 100F), but in some cases the posterior pair is very small or even absent. The species has, therefore, been placed in two different couplets in the key.

The female genitalia of this species have been used for the illustrating of these structures for the present genus (fig. 99T–V).

MATERIAL EXAMINED: Argentina: Salta: Aguarray, January, 1957, at light (Wygodzinsky; the American Museum of Natural History), one female; Pocitos, January 14, 1959, at light (Carcavallo and Martínez; Mision de Estudios de Patalogía Regional Argentina), one male.

DISTRIBUTION: Northern and central Argentina; Bolivia; Brazil (Minas Gerais).

TYPE: Female, Museo Argentino de Ciencias Naturales.

Stenolemus dureti Wygodzinsky

Figures 99A; 100B

Stenolemus dureti WYGODZINSKY, 1954b, p. 313, figs. 69–73.

The forewing and thorax are illustrated here.

DISTRIBUTION: Argentina (Misiones).

TYPE: Male, the American Museum of Natural History.

Stenolemus edwardsii Bergroth

Stenotaemus (sic) edwardsii BERGROTH, 1916, p. 347.

MATERIAL EXAMINED: Australia: Launceston (South Australian Museum), one specimen; Adelaide (Johnson; South Australian Museum), one male; Victoria: Hawthorn, December, 1950 (W. L. Brown; the American Museum of Natural History), one male; south Gippsland (H. W. Davey; South Australian Museum), one female. Tasmania: Hobart (Lea; South Australian Museum), one male; no locality (South Australian Museum), one female.

DISTRIBUTION: Australia; Tasmania.

TYPE: Male, the American Museum of Natural History.

Stenolemus eucnemus Wygodzinsky

Figure 98G, H

Stenolemus eucnemus WYGODZINSKY, 1958b, p. 340, figs. 44–51.

The second segment of the rostrum is extraordinarily swollen (fig. 98G).

DISTRIBUTION: New Guinea.

TYPE: Male, British Museum (Natural History).

Stenolemus facetus Wygodzinsky

Figure 98O, R

Stenolemus facetus WYGODZINSKY, 1958b, p. 342, figs. 52–58.

The incomplete brushlike tufts found on the mid and hind femora are very typical of this and closely related Pacific species (fig. 98O). The very extensively darkened forewing is characteristic (fig. 98R).

DISTRIBUTION: Philippines.

TYPE: Male, British Museum (Natural History).

Stenolemus fasciculatus Dohrn

Plate 3, figure 2

Stenolemus fasciculatus DOHRN, 1860, p. 250.

MATERIAL EXAMINED: Celebes: September, 1923 [C. J. Brooke; British Museum (Natural History)], one female; south Celebes, Patunuang, January, 1896 (Fruhstorfer; the American Museum of Natural History), one female.

DISTRIBUTION: Celebes.

TYPE: Unknown.

Stenolemus fraterculus Wygodzinsky

Figure 98E, I–J

Stenolemus fraterculus WYGODZINSKY, 1956, p. 206, figs. 86–91.

The original illustrations are here reproduced.

DISTRIBUTION: Australia.

TYPE: Male, the American Museum of Natural History.

Stenolemus gerardi Villiers

Stenolaemus gerardi VILLIERS, 1949a, p. 307, figs. 113, 116, 121.

DISTRIBUTION: Congo (Léopoldville); Ruanda.

TYPE: Male, Musée Royal de l'Afrique Centrale.

Stenolemus giraffa Wygodzinsky

Figure 98F

Stenolemus giraffa WYGODZINSKY, 1956, p. 207, figs. 93–97.

The most extraordinary pronotum of this species is illustrated again here.

MATERIAL EXAMINED: Australia: Northern Territory: Roper River (N. B. Tindale; South Australian Museum), one female.

DISTRIBUTION: Australia.

TYPE: Female, British Museum (Natural History).

Stenolemus grandidieri Villiers

Stenolaemus grandidieri VILLIERS, 1949a, p. 304, figs. 112–119.

DISTRIBUTION: Madagascar.

TYPE: Female, Muséum National d'Histoire Naturelle.

Stenolemus greeni Distant

Stenolaemus greeni DISTANT, 1903b, p. 256.

DISTRIBUTION: India; Ceylon.

TYPE: British Museum (Natural History).

Stenolemus haoussa Villiers

Stenolemus haoussa VILLIERS, 1960b, p. 271, figs. 8, 9.

DISTRIBUTION: Niger.

TYPE: Male, Muséum National d'Histoire Naturelle.

Stenolemus hirtipes Distant

Stenolemus hirtipes DISTANT, 1919, p. 71.

It has not been possible to place this species in the key from the description alone.

DISTRIBUTION: Southern India.

TYPE: British Museum (Natural History).

Stenolemus huali Wygodzinsky and Abalos

Figures 99I; 100H

Stenolemus huali WYGODZINSKY AND ABALOS, 1950, p. 105, figs. 2I, 2K, 3A, 4C.

The fore femur and the wing pattern are illustrated here.

DISTRIBUTION: Bolivia.

TYPE: Male, Instituto Miguel Lillo.

Stenolemus interstitialis McAtee and Malloch

Stenolemus interstitialis MCATEE AND MALLOCH, 1925, p. 31, fig. 25.

DISTRIBUTION: French Guiana and British Guiana.

TYPE: Male, Muséum National d'Histoire Naturelle.

Stenolemus iturianus Villiers

Stenolaemus iturianus VILLIERS, 1948, p. 443, fig. 860.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Musée Royal de l'Afrique Centrale.

Stenolemus kabylinus Dispons

Stenolaemus kabylinus DISPONS, 1955, p. 175 (footnote).

This species was redescribed and partly illustrated by Dispons and Stichel (1959).

DISTRIBUTION: Algeria.

TYPE: Unknown.

Stenolemus lanipes Wygodzinsky

Stenolemus hirtipes MCATEE AND MALLOCH, 1925, p. 32, figs. 26, 27.

Stenolemus lanipes WYGODZINSKY, 1949b, p. 33.

DISTRIBUTION: Southeastern United States.

TYPE: Female, United States National Museum.

Stenolemus larat, new species

Figure 98A–D

DESCRIPTION: Female: Length to apex of forewing, 9 mm.

General color white to stramineous, pattern elements brown to piceous. Color of head stramineous, with extensive piceous pattern elements as shown in figure 98A. Rostrum brown; basal half of first segment whitish. First segment of antennae whitish, with one subbasal annulus, one submedian narrow annulus, and one wide subapical annulus brown; second segment piceous, one wide basal annulus, two narrow submedian annuli, and one apical annulus stramineous; third segment piceous, apex narrowly stramineous; fourth segment whitish, piceous at base and apex. Pronotum almost uniformly stramineous; lateral surface of mesothorax and metathorax piceous, acetabula flavescent; scutellum and metanotum with spines piceous, hind border of scutellum and apex of scutellar

spine stramineous. Color of forelegs whitish; coxa with one submedian, and one subapical, narrow brown annuli; trochanter whitish; femur with one subbasal, and two submedian, narrow brown annuli and one wider piceous subapical annulus; tibia with two strongly approximated subbasal, and one submedian, narrow brownish annuli; tarsus white, apex of second segment darkened. Long hairs of forelegs moderately numerous; those of subapical annulus of femur and of subbasal annuli of tibia concolorous, more numerous but not forming distinct tufts. Coxae of mid and hind legs piceous; trochantera, femora, and tibiae stramineous, femora-tibial articulations broadly white, remaining light-colored regions minutely and faintly spotted with dark at insertion of hairs. Femora and tibia with moderately numerous, very long hairs, diminishing in size toward apex of tibiae. Femora of second pair with three brushlike tufts of medium-sized hairs, basal and apical ones piceous, median one golden-colored. Femora of third pair with four tufts, two basal and apical one piceous, remaining one golden-colored. Mid and hind tibiae with one subbasal, piceous tuft. Color of forewings white, slightly nacreous, pattern elements fuscous to piceous, their distribution as shown in figure 98A. Hind wings whitish. Abdomen piceous, small areas on posterior segments flavous.

Body surface with rather long, depressed, curved pubescence, especially on head and prothorax; long erect hairs present in moderate number only.

Head as shown in figure 98A, B, short. Anteocular region elevated; postocular region dorsally behind constriction with 1+1 conical, apically rounded projections. Eyes small; their distance dorsally equal to one and one-half times their width; rounded in lateral aspect, not attaining level of dorsal and ventral surface of head. Rostrum as shown in figure 98B; second segment swollen but longer than high; third segment very slender. Length of first segment of antennae, 2.5 mm.; relative length of segments, 1/0.8/0.16/0.35. First segment with extremely long, though not very numerous, delicate hairs dorsally and ventrally, shorter and somewhat more dense toward apex; a very few long hairs at base of second segment; rest of second, third, and fourth segments with short pile only.

Shape of prothorax as shown in figure 98A, B. Fore lobe globular, sharply detached from petiole; latter almost three times as long as fore lobe and one and one-half times as long as hind lobe, slender. Hind lobe bell-shaped, with 2+2 stout, apically rounded projections, submedian larger than humeral ones (fig. 98B); disc with a distinct median depression, limited laterally by 1+1 carinae which lead to submedian projections, depression along center with a less-developed third carina. Spines of scutellum and metanotum short, erect, pointed apically, with short hairs only.

Forelegs as shown in figure 98B, D. Fore coxa about as long as hind lobe of pronotum. First and second large, spiniferous processes of femur much larger than any of remainder, about as large as diameter of segment, first very strongly inclined toward base of femur. Posteroventral series with two large spiniferous processes and about 15 medium-sized and small ones, series not reaching beyond five-eighths of length of segment. Anteroventral series composed of about 20 medium-sized and small processes, occupying whole length of femur. Tibia with about 20 spines arranged in two irregular rows. Mid and hind legs very long and slender, hind femora surpassing apex of abdomen by 4.5 mm.

Forewings rather narrow, surpassing apex of abdomen by about 1 mm., their shape and venation as shown in figure 98A.

Abdomen as shown in figure 98B, rather narrow, hardly widened posteriorly; dorsal or ventral projections lacking. Connexival angles salient, lobate. Surface of abdomen dull.

MATERIAL EXAMINED: Moluccas: Larat, December, 1909 (Bernice P. Bishop Museum), one female.

OBSERVATIONS: This species belongs to a group of *Stenolemus* of the Pacific area distinguished by their long legs and conspicuous bristle tufts on the mid and hind femora and tibiae. The key furnishes the data necessary for a comparison with related species.

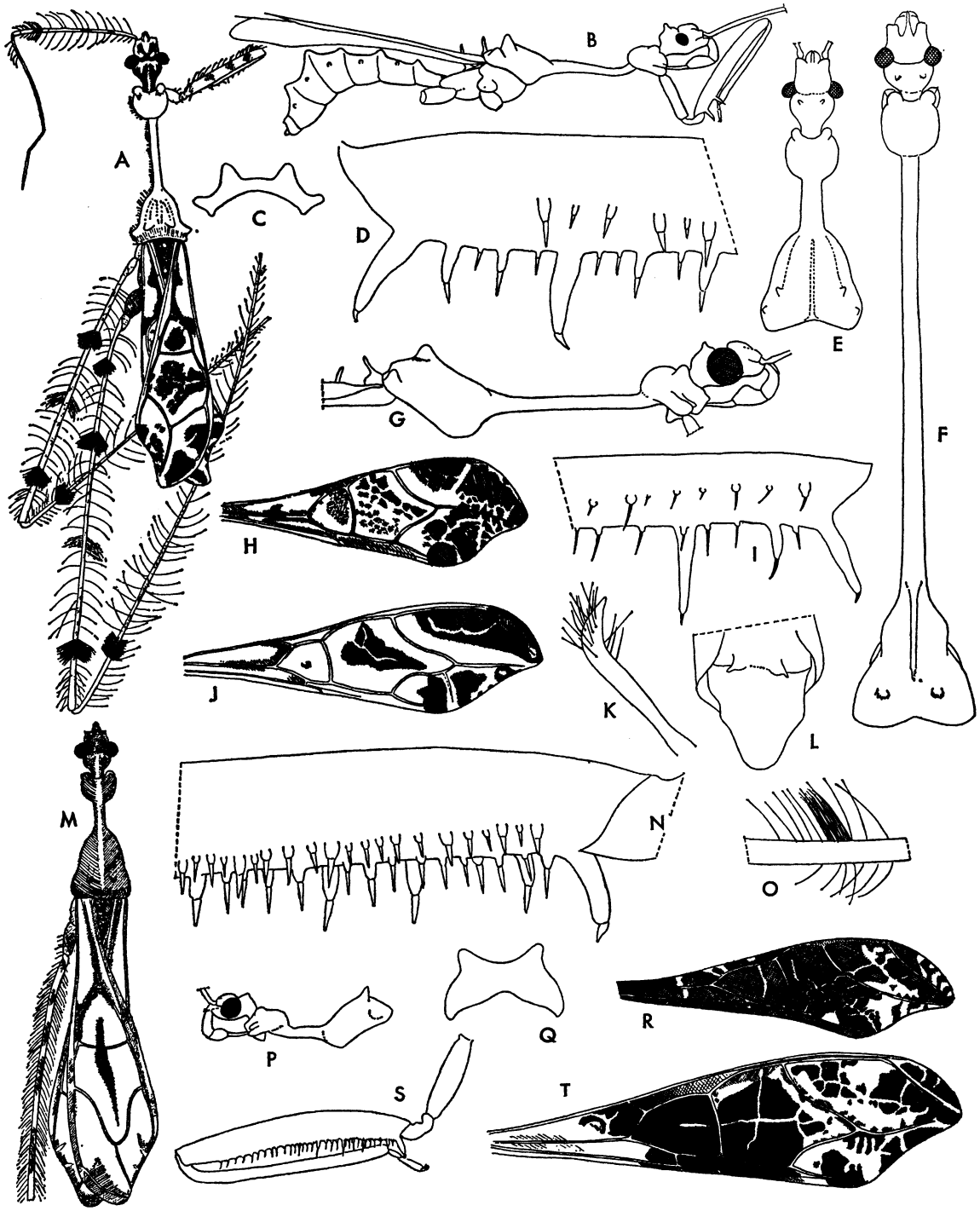
Stenolemus laticeps Horváth

Stenolaemus laticeps HORVÁTH, 1914a, p. 650.

The species was first illustrated by Horváth (1924).

DISTRIBUTION: Egypt.

TYPE: Male, Hungarian National Museum.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T

Stenolemus lenti Espínola and Silva

Stenolemus lenti ESPÍNOLA AND SILVA, 1963, p. 81, figs. 1–6.

DISTRIBUTION: Brazil (Mato Grosso).
TYPE: Female, Instituto Nacional de Endemias Rurais.

Stenolemus longicornis Blatchley

Stenolemus longicornis BLATCHLEY, 1925, p. 46.
Stenolemus pristinus MCATEE AND MALLOCH, 1925, p. 29, fig. 17.

DISTRIBUTION: United States (Florida).
TYPES: Of *Stenolemus longicornis*, unknown; of *Stenolemus pristinus*, female, United States National Museum.

Stenolemus macrostylus Horváth

Stenolaemus macrostylus HORVÁTH, 1922, p. 104, figs. 1, 2.

DISTRIBUTION: Egypt.
TYPE: Unknown.

Stenolemus madagascariensis (Westwood)

Ploearia madagascariensis WESTWOOD, 1846, p. 65.
Stenolaemus madagascariensis: BERGROTH, 1887, p. 17.

This species has been illustrated by Villiers (1949a).
DISTRIBUTION: Madagascar.
TYPE: Muséum National d'Histoire Naturelle.

Stenolemus marlieri Villiers

Stenolemus marlieri VILLIERS, 1961, p. 35, figs. 1–4.

DISTRIBUTION: Congo (Léopoldville).
TYPE: Musée Royal de l'Afrique Centrale.

Stenolemus marshalli Distant

Stenolemus marshalli DISTANT, 1903d, p. 51.

DISTRIBUTION: Rhodesia; Mozambique.
TYPE: British Museum (Natural History).

Stenolemus mexicanus McAtee and Malloch

Stenolemus mexicanus MCATEE AND MALLOCH, 1925, p. 32, fig. 28.

DISTRIBUTION: Mexico.
TYPE: Female, Iowa State College.

Stenolemus minensis Wygodzinsky

Plate 2, figure 6

Stenolemus minensis WYGODZINSKY, 1947b, p. 129, figs. 1–6.

DISTRIBUTION: Brazil (Minas Geraes; Rio de Janeiro).
TYPE: Female, Instituto de Ecologia e Experimentação Agrícolas.

Stenolemus mirabilis Wygodzinsky

Figures 99B; 100I

Stenolemus mirabilis WYGODZINSKY, 1947b, p. 134, figs. 12–17.

The very peculiar structure of the pronotum and the dorsal processes of the abdomen are illustrated here.
MATERIAL EXAMINED: Panama: Canal Zone, Barro Colorado Island, June 22, 1962 (H. Ruckes; the American Museum of Natural History), one male.
DISTRIBUTION: Panama.
TYPE: Male, United States National Museum.

Stenolemus monodi Villiers

Stenolemus monodi VILLIERS, 1963, p. 556.

This species, not included in the key, is apparently close to *kabylinus* and *novaki*.
DISTRIBUTION: Guinea.
TYPE: Muséum National d'Histoire Naturelle.

FIG. 98 (OPPOSITE PAGE). A–D. *Stenolemus larat*, female. A. General aspect, with color pattern. B. Body, side view. C. Posterior lobe of pronotum, seen from behind. D. Base of fore femur. E. *Stenolemus fraterculus*, male, head and prothorax, dorsal view. F. *Stenolemus giraffa*, female, head and prothorax, dorsal aspect. G, H. *Stenolemus eucnemus*, male. G. Anterior portion of body, lateral view. H. Forewing, with color pattern. I–L. *Stenolemus fraterculus*, male. I. Base of fore femur. J. Forewing, with color pattern. K. Paramere. L. Apex of abdomen, seen from above. M, N. *Stenolemus susainathani*, female. M. General aspect, with color pattern. N. Base of fore femur. O. *Stenolemus facetus*, portion of mid femur. P, Q. *Stenolemus susainathani*, female. P. Head and prothorax, lateral view. Q. Posterior lobe of prothorax, seen from behind. R. *Stenolemus facetus*, forewing, with color pattern. S. *Stenolemus susainathani*, foreleg. T. *Stenolemus bituberus*, forewing, with color pattern.

Stenolemus muiri (Kirkaldy)

Phantasmatophanes muiri KIRKALDY, 1908b, p. 371, fig. 2.

Stenolemus muiri: WYGODZINSKY, 1958b, p. 342.

This is the type of *Phantasmatophanes*. The general aspect of the species was illustrated in the original description. It is quite similar to that of *S. larat* described above (see fig. 98A). The external view of the genital region of the male is exactly like that of the remaining species of the genus.

MATERIAL EXAMINED: Fiji: Ovalau: Thawati, dead branches, 800 feet (E. C. Zimmerman: Bernice P. Bishop Museum), one male.

DISTRIBUTION: Fiji.

TYPE: Male, Bernice P. Bishop Museum.

Stenolemus novaki Horváth

Stenolemus novaki HORVÁTH, 1888, p. 178, pl. 1, fig. 7.

Ribes (1961) illustrated the general aspect of the species.

DISTRIBUTION: Spain; France; Italy; Yugoslavia; Israel; Egypt.

TYPE: Hungarian National Museum.

Stenolemus ornatus Villiers

Stenolaemus ornatus VILLIERS, 1949a, p. 204, figs. 111, 118, 122.

DISTRIBUTION: Congo (Léopoldville); Angola.

TYPE: Female, Musée Royal de l'Afrique Centrale.

Stenolemus ornatus shinyanga Wygodzinsky

Stenolemus ornatus shinyanga WYGODZINSKY, 1958b, p. 344, figs. 59–66.

DISTRIBUTION: Tanganyika.

TYPE: Female, British Museum (Natural History).

Stenolemus pallidipennis McAtee and Malloch

Figure 99C

Stenolemus pallidipennis MCATEE AND MALLOCH, 1925, p. 30, figs. 19–22.

This is one of the two species of the genus that lack a petiole to the pronotum (fig. 99C). All other characters, including the aspect of the male genital region, are like those in the remaining species of the genus.

MATERIAL EXAMINED: United States: Arizona: Painted Canyon Ranch, Chiricahua Mountains, August 1, 1954 (M. Cazier; the American Museum of Natural History), one male; Cochise County: Southwestern Research Station, 5 miles west of Portal, 5400 feet, May and June (the American Museum of Natural History), very numerous specimens of both sexes.

DISTRIBUTION: United States (Arizona).

TYPE: Male, United States National Museum.

Stenolemus papuensis Horváth

Stenolaemus papuensis HORVÁTH, 1914a, p. 651.

DISTRIBUTION: New Guinea.

TYPE: Female, Hungarian National Museum.

Stenolemus perplexus McAtee and Malloch

Figure 3H

Stenolemus perplexus MCATEE AND MALLOCH, 1925, p. 33, fig. 32.

MATERIAL EXAMINED: *Peru:* Tingo María, Monson Valley, July 11, 1954 (E. I. Schlinger and E. S. Ross; the California Academy of Sciences), one male. *Paraguay:* Villa Rica, March 19, 1925 (F. Schade; Museum Zoologicum Universitatis), one female.

DISTRIBUTION: Peru; Paraguay; Brazil.

TYPE: Male, Cornell University.

Stenolemus plaumanni Wygodzinsky

Figure 100D

Stenolemus plaumanni WYGODZINSKY, 1943, p. 448, figs. 14–25.

The bristle tufts on the mid and hind legs that are found in *plaumanni* (fig. 100D) are typical for many species of the genus.

DISTRIBUTION: Southern Brazil.

TYPE: Female, Instituto de Ecologia e Experimentação Agrícolas.

Stenolemus plumosus Stål

Stenolemus plumosus STÅL, 1871, p. 702.

The species was redescribed and figured by McAtee and Malloch (1926). The genitalia of the male have been examined in detail; they agree well with those of the other species of the genus.

MATERIAL EXAMINED: Philippines: Luzon: Mt. Maquiling (Baker; Naturhistoriska Riksmuseet), one male.

DISTRIBUTION: Philippines.

TYPE: Naturhistoriska Riksmuseet.

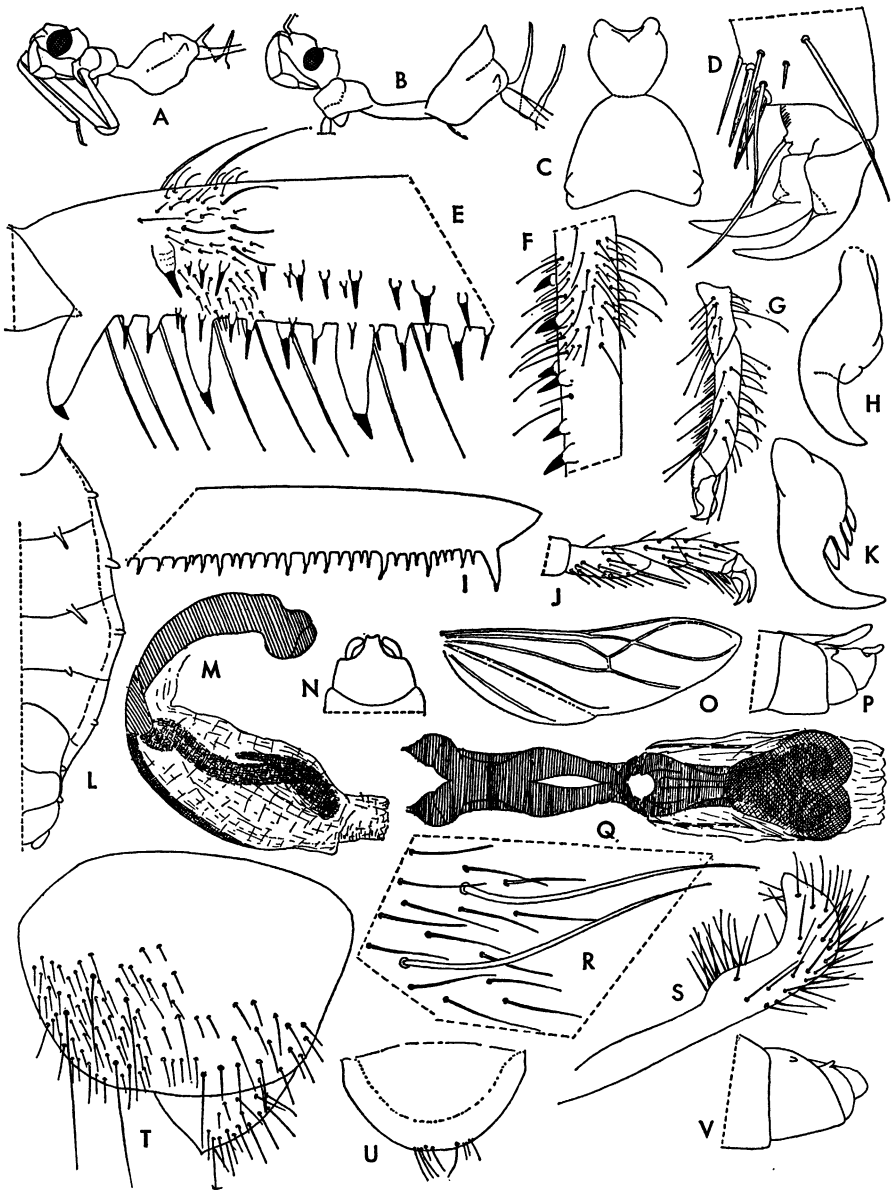


FIG. 99. A. *Stenolemus dureti*, male, anterior portion of body, lateral view. B. *Stenolemus mirabilis*, anterior portion of body, lateral aspect. C. *Stenolemus pallidipennis*, thorax, dorsal view. D–H. *Stenolemus spiniventris*. D. Apex of posterior tarsus, with praetarsus and claws. E. Base of fore femur, with setae shown on only one section. F. Portion of fore tibia. G. Fore tarsus. H. Inner claw of foreleg. I. *Stenolemus huali*, basal half of fore femur, with posteroventral series. J–S. *Stenolemus spiniventris*, male. J. Posterior tarsus. K. Outer claw of foreleg. L. Left side of abdomen, ventral view. M. Phallus, lateral aspect. N. Pygophore, posterior view. O. Hind wing. P. Apex of abdomen, lateral aspect. Q. Phallus, dorsal view. R. Setae of eighth sternite. S. Paramere. T–V. *Stenolemus decarloi*, female. T. Gonocoxite and gonapophysis. U. Syngonapophysis. V. Apex of abdomen, lateral view.

Stenolemus quadriannulatus McAtee and Malloch

Stenolemus quadriannulatus McAtee and Malloch, 1926, p. 133.

Distribution: Philippines.

Type: Male, United States National Museum.

Stenolemus saileri Wygodzinsky

Stenolemus saileri Wygodzinsky, 1947b, p. 139, figs. 24–30.

Material Examined: Panama: Canal Zone: Barro Colorado Island, April 28, 1962, July 1, 1962 (H. Ruckes; the American Museum of Natural History), one male, one female.

Distribution: Panama; Bolivia.

Type: Female, United States National Museum.

Stenolemus sarampiuni Wygodzinsky

Stenolemus sarampiuni Wygodzinsky, 1960a, p. 301, figs. 16–21.

Distribution: Bolivia.

Type: Female, Zoologische Sammlung des Bayerischen Staates.

Stenolemus schwarzii Bergroth

Stenolaemus schwarzii Bergroth, 1916, p. 229.

McAtee and Malloch (1925) illustrated the forewing of the species.

Distribution: Mexico; Honduras.

Type: Female, United States National Museum.

Stenolemus spiniventris Signoret

Figure 99D–H, J–S

Stenolemus spiniventris Signoret, 1858, p. 253.
Stenolemus spiniger McAtee and Malloch, 1925, p. 33, figs. 29–31.

This is the type species of *Stenolemus*. It has been considered useful to illustrate here its main morphological features.

Material Examined: *United States:* Texas: Brownsville, June 29, 1938 (the University of Kansas), three males, determined by J. Elkins as *Stenolemus spiniventris;* Brownsville, September 16, 1942 (T. M. Burns; the California Academy of Sciences), one male. *Mexico:* Nuevo Leon: 20 miles west of Linares, November 8, 1946 (E. S. Ross; the California Academy of Sciences), one female.

Distribution: United States (Texas); Mexico; Guatemala.

Type: Naturhistorisches Museum, Vienna.

Stenolemus susainathani, new species

Figure 98M, N, P, Q, S

Description: Female: Length to apex of forewings, 9 mm.

General color whitish, pattern elements brownish to piceous. Head piceous, a median longitudinal line of postocular region, as well as projections of latter, ochraceous; rostrum piceous. First segment of antennae whitish, with two or three faint brown annuli; second and third segments brown, fourth whitish, base and apex piceous. Color of prothorax fulvous, darker on hind lobe, with a white, median, longitudinal line. Mesopleura and metapleura and sterna fulvous, some regions lighter-colored. Scutellum and metanotum fulvous, spines concolorous. Forelegs stramineous, indistinctly annulated with brown; long hairs mainly on dorsal surface of femur and tibia. Coxae and trochantera of mid and hind legs brownish; femora whitish, with four faint brownish annuli which are wider than intervening white spaces; mid and hind tibiae stramineous, indistinctly annulated with brown. General color of forewings white, subhyaline, a narrow piceous stripe extending longitudinally from center of anterior almost to apex of discal cell; rest of pattern limited to darkly marginated veins and a few small spots at apex of wings. Hind wings faintly yellowish. Abdomen piceous, a few small areas ochraceous. Body, legs, and costal margin of forewings with numerous curved, semierect hairs, those of femora and tibiae numerous but not forming tufts (fig. 98M).

Shape of head as shown in figure 98M, P, short; postocular region behind constriction with 1+1 short elevations. Eyes medium-sized, their distance dorsally one and one-half times their width, suboval in lateral view, almost attaining level of ventral and dorsal surface of head. Rostrum as shown in figure 98P; second segment much shorter than first, swollen but longer than high; third segment slender. Length of first segment of antennae, 2.7 mm.; relative length of segments, 1/-0.85/0.15/0.27. First segment with long, curved hairs, a few of these also on base of

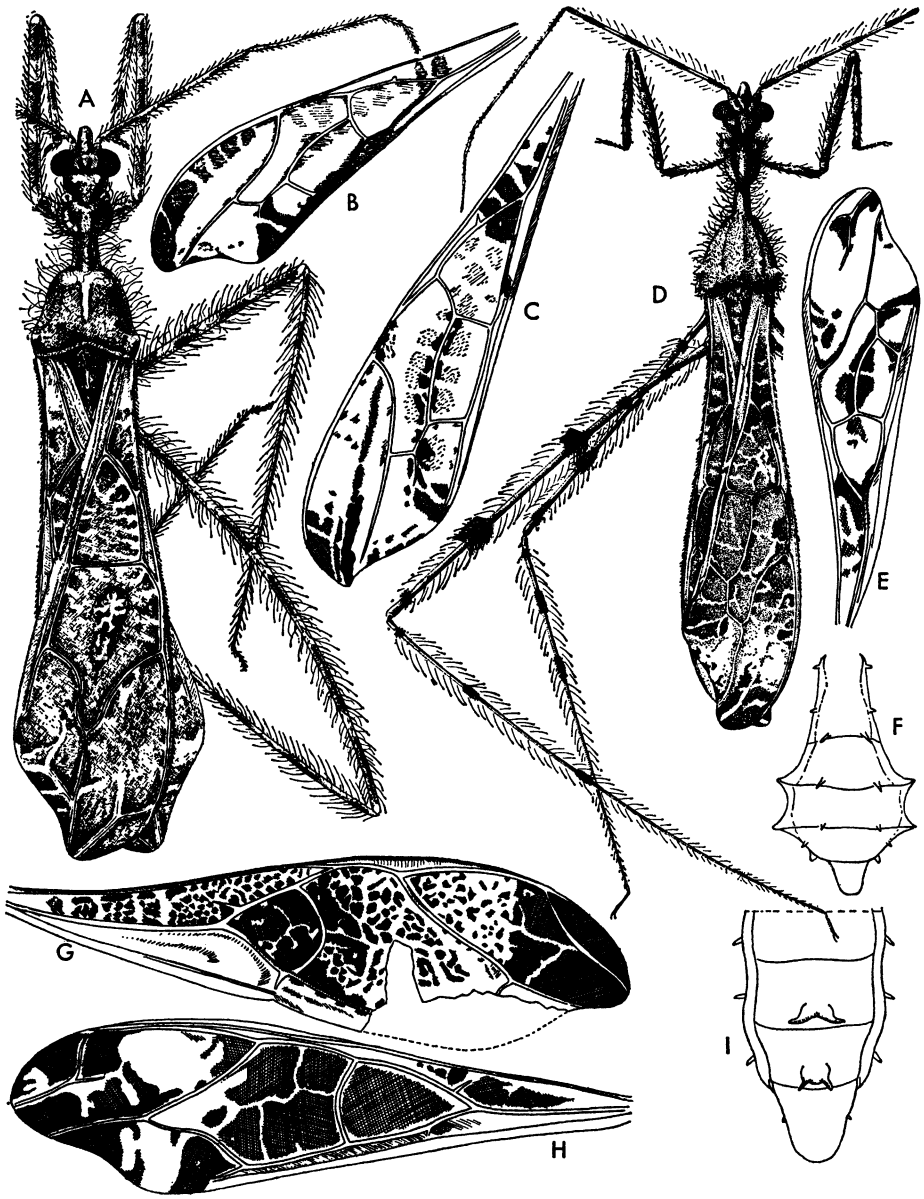


FIG. 100. A. *Stenolemus vianai*, general aspect, with color pattern. B. *Stenolemus dureti*, forewing, with color pattern. C. *Stenolemus calilegua*, forewing, with color pattern. D. *Stenolemus plaumanni*, general aspect, with color pattern. E. *Stenolemus apiguassu*, forewing, with color pattern. F. *Stenolemus decarloi*, female, abdomen, from below. G. *Stenolemus teffeanus*, forewing, with color pattern. H. *Stenolemus huali*, forewing with color pattern. I. *Stenolemus mirabilis*, male, apical half of abdomen, dorsal view. (A drawn by Berta Juarez Heredia; D, by Antonio de Lemos Pereira.)

second segment; rest of antennae shortly pilose only.

Shape of pronotum as shown in figure 98M, P. Fore lobe subglobular, sharply detached from petiole, latter about as long as fore lobe and half as long as hind lobe, slightly widened posteriorly. Posterior lobe of pronotum elongate, bell-shaped, somewhat compressed laterally, posteriorly with 1+1 submedian, conical, pointed elevations; humeral angles not elevated. Disc slightly depressed longitudinally at middle, center of depression with a low carina, depressed area bordered laterally by 1+1 faint carinae, which lead to base of posterior processes where they become more distinct. Spine of scutellum almost horizontal, of metanotum inclined posteriorly; both short, pointed apically, with hairs as on rest of body surface.

Forelegs short, their shape and structure as shown in figure 98N, S. Coxa about as long as hind lobe of pronotum. Posteroventral series of femur composed of one large basal spiniferous process, very much larger than any of remainder, strongly inclined toward base of article, and three to four medium-sized and about 36 small ones; series occupying whole length of article. Tibia with approximately 50 spines. Mid and hind legs short, posterior femora not distinctly surpassing apex of forewings.

Forewings relatively narrow, their shape and venation as shown in figure 98M, surpassing apex of abdomen by approximately 2 mm.

Abdomen slender, somewhat widened posteriorly, lacking dorsal or ventral processes; connexival margins entire; spiracles conical, short. Surface of abdomen subshining.

MATERIAL EXAMINED: India: Cherangoda, Nilgiri Hills, October–November, 1950, 3500 feet (P. Susai Nathan; the American Museum of Natural History), one female holotype, one female paratype.

OBSERVATIONS: This species is named for its collector in recognition of his valuable work with Indian insects. *Stenolemus susainathani* is sufficiently characterized by the peculiar color pattern of its forewings.

Stenolemus teffeanus Wygodzinsky and Abalos

Figure 100G

Stenolemus teffeanus WYGODZINSKY AND ABALOS, 1950, p. 107, figs. 3C, 2D, 3E, 4D.

The very characteristic wing pattern is shown here.

DISTRIBUTION: Brazil (Amazonas).

TYPE: Male, United States National Museum.

Stenolemus variatus McAtee and Malloch

Stenolemus variatus MCATEE AND MALLOCH, 1925, p. 31, fig. 24.

DISTRIBUTION: Argentina (Misiones).

TYPE: Male, Muséum National d'Histoire Naturelle.

Stenolemus vianai Wygodzinsky and Abalos

Figure 100A

Stenolemus vianai WYGODZINSKY AND ABALOS, 1950, p. 109, figs. 1, 2E, 2F, 3D.

The yellowish ameboid spot in the discal cell of the forewing (fig. 100A) is characteristic of a considerable number of species of *Stenolemus* of the New World.

MATERIAL EXAMINED: Argentina: Lamarque, Río Negro (Fritz; the American Museum of Natural History), one female.

DISTRIBUTION: Argentina (Córdoba; Río Negro).

TYPE: Male, Museo Argentino de Ciencias Naturales.

Stenolemus villiersi, new name

Stenolaemus mirabilis VILLIERS, 1952a, p. 162, fig. 7 (preoccupied by *Stenolemus mirabilis* Wygodzinsky, 1947).

DISTRIBUTION: Dahomey.

TYPE: Male, Institut Français d'Afrique Noire.

Stenolemus wygodzinsky Espínola, Xavier, and Mattos

Stenolemus wygodzinskyi ESPÍNOLA, XAVIER, AND MATTOS, 1961, p. 117, figs. 1–5.

DISTRIBUTION: Brazil (Minas Geraes).

TYPE: Male, Instituto Nacional de Endemias Rurais.

Stenolemus zikani Wygodzinsky

Stenolemus zikáni WYGODZINSKY, 1943, p. 445, figs. 1–12.

DISTRIBUTION: Brazil (Estado do Rio).

TYPE: Male, Instituto Oswaldo Cruz.

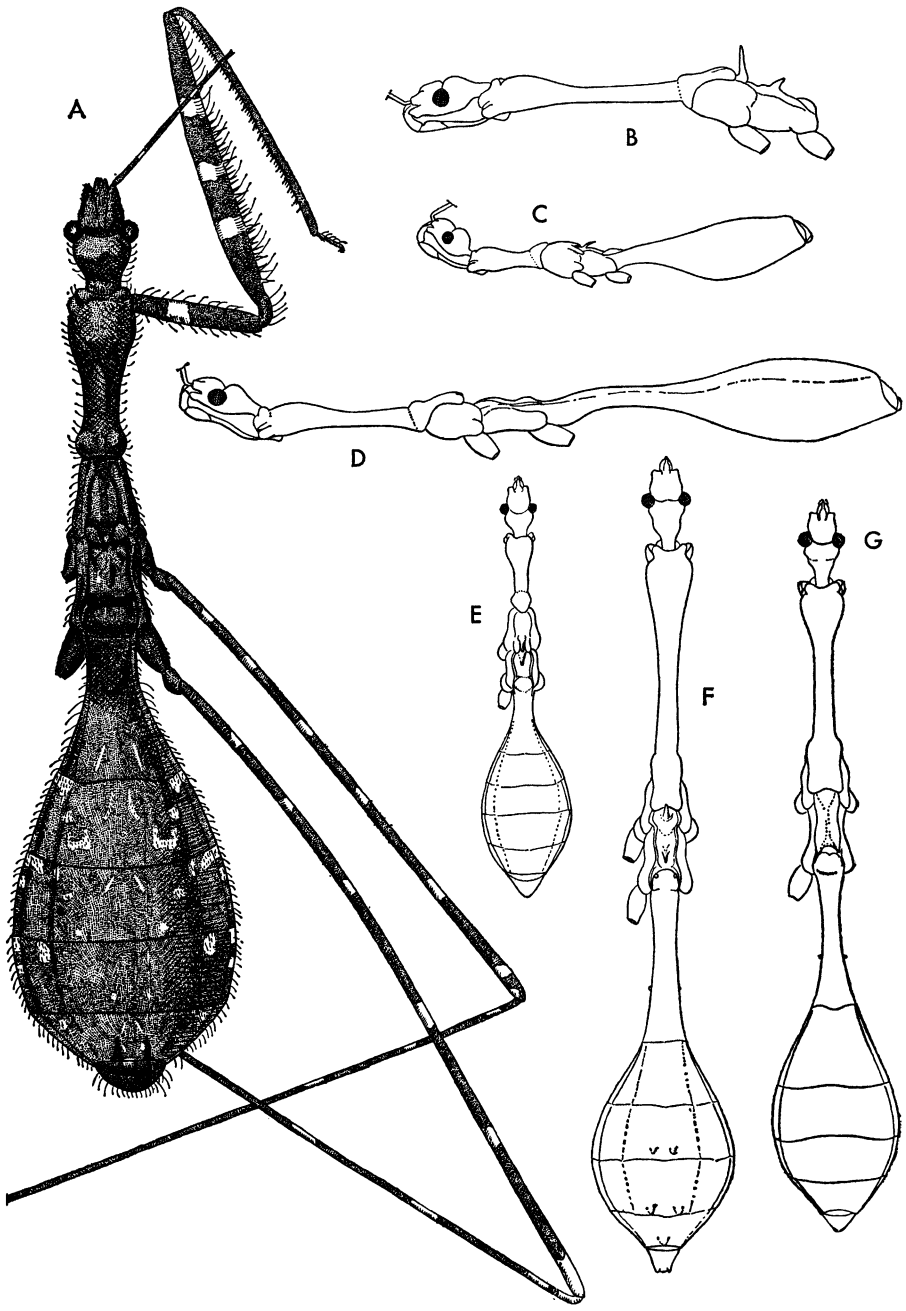


FIG. 101. Emesini *incertae sedis*, females. A. *Dohrnemesa feminata*, general aspect, with color pattern. B. Species II, anterior portion of body, side view. C. Species III, body, side view. D. Species V, body, lateral aspect. E. Species III, general aspect. F. Species II, general aspect. G. Species V, general aspect.

EMESINI INCERTAE SEDIS

GARDENOIDES PAULIAN AND GRJEBINE

Gardenoides PAULIAN AND GRJEBINE, 1953, p. 26.

The very short descriptions of this genus and its only included species are not sufficient for one to establish its systematic position or even to affirm its validity. The only included species is apterous and found in caves.

Owing to its doubtful status, *Gardenoides* has not been included in the discussion of the geographical distribution of the Emesinae, nor could it be placed in the key to the genera of the Emesini.

TYPE SPECIES: *Gardenoides speluncarius* Paulian and Grjebine.

DISTRIBUTION: Madagascar.

Gardenoides speluncarius Paulian and Grjebine

Gardenoides speluncarius PAULIAN AND GRJEBINE, 1953, p. 27, figs. 3, 4.

The original illustrations are not sufficient to solve the riddle of the taxonomic position of *Gardenoides*.

DISTRIBUTION: Madagascar.

TYPE: Male, Institut de Recherche Scientifique de Madagascar.

I have examined a number of female specimens of the Emesini that share an apterous or extremely micropterous condition, a very slender, almost pedunculate pronotum, and a pedunculate, physogastrous abdomen; their forelegs are characterized by normally developed spiniferous tubercles on the femora, a single row of spines on the under surface of the tibiae, and three-segmented tarsi. In one apterous and one micropterous form, the hind lobe of the pronotum is strongly reduced so as to leave the mesonotum exposed (fig. 101A, E). In the remaining species, all apterous, the hind lobe of the pronotum, though somewhat narrower than usual, is normally developed and covers the mesonotum to the base of the scutellum (fig. 101F, G). There is no apparent correlation between the development of the pronotum and that of the scutellar and metanotal spines. Both of the latter are well developed in one species with a complete pronotum (fig. 101B, F) and one with a reduced (fig. 101E) pronotum. The former is apterous; the latter, micropterous. Only the scutellar spine is developed in one apterous species that has a complete pronotum, and both spines are lacking in two apterous species, one with a complete (fig. 101G), and one with a reduced (fig. 101A), pronotum.

It is not possible to place these specimens generically, as no correlated normally winged males are available. A process of elimination indicates that the present assortment, though probably not monophyletic, centers around the genera *Polauchenia* and *Dohrnemesa*.

The specimens belonging here are enumerated below.

Dohrnemesa feminata Wygodzinsky

Figure 101A

Dohrnemesa feminata WYGODZINSKY, 1947a, p. 509, figs. 1–27.

Size, 8.5 mm.; hind lobe of pronotum reduced; mesonotum and metanotum lacking spine; apterous.

DISTRIBUTION: Brazil (Estado do Rio).

TYPE: Female, Instituto de Ecologia e Experimentação Agricolas.

SPECIES II

Figure 101B, F

Size, 14 mm.; hind lobe of pronotum completely covering mesonotum; scutellum and metanotum distinctly spined; apterous.

MATERIAL EXAMINED: Costa Rica: Hamburg Farm, Río Reventazón, April 30 to May 8 (Reimoser; Naturhistorisches Museum, Vienna), one female.

SPECIES III

Figure 101C, E

Size, 6.5 mm.; hind lobe of pronotum reduced; mesonotum and metanotum each with a short, stout spine; micropterous.

MATERIAL EXAMINED: Costa Rica: Milla 52, Región Atlántica, January 12, 1947 (Bierig; the American Museum of Natural History), one female.

SPECIES IV

Size, 10 mm.; hind lobe of pronotum completely covering mesonotum; scutellum with, metanotum without, spine; apterous.

MATERIAL EXAMINED: Panama: Canal Zone: Barro Colorado Island, July 16, 1924 (N. Banks; Museum of Comparative Zoölogy), one female.

SPECIES V

Figure 101D, G

Size, 12 mm.; hind lobe of pronotum completely covering mesonotum; scutellum and metanotum lacking spines; apterous.

MATERIAL EXAMINED: British Guiana: Essequibo River, Moraballi Creek, July 31, 1928 [Oxford University Expedition; British Museum (Natural History)], one female.

PLOIARIOLINI VAN DUZEE

Ploiarioliinae (part) VAN DUZEE, 1916, p. 27.

The Ploiariolini, herein recognized as a separate unit for the first time, have been included formerly in the Emesini. The synonymy given under the latter group applies in part to the present tribe.

DESCRIPTION: Small species (3–11 mm.). Rarely almost concolorous, mostly with conspicuous markings. Setae of mid and hind legs and of abdomen differentiated into microchaetae and macrochaetae.

Head, rostrum, and fore coxae generally without, very rarely with, spines.

Rostrum usually strongly bent between first and second segments. Ratio of first antennal segment to third, 1/0.5–0.17.

Winged and micropterous or apterous forms known, two latter very rare. Mesonotum of winged form invariably covered by pronotum. Scutellum and metanotum with or without spine.

Coxae of forelegs very rarely, trochantera in no instance, spined. Spines of tibiae reduced to inconspicuous setae. Fore tibiae more than half as long as femora. Fore tarsi generally not distinctly longer than mid or hind ones, at most one-third as long as tibiae, generally much shorter. Tarsi two-segmented or rarely three-segmented, if three-segmented then basal segment not shorter than second; segments movably articulated, hairy on all surfaces, not strongly sclerotized. Claws of fore tarsus subequal in size, inner one with a medially incised ventral lamella, outer one with a few short, small projections on basal half of under surface; arolia elongate. Claws of mid and hind legs on under surface with a low, medially incised lamella.

Forewings with one, two, or three cells, viz., either with only discal cell, in some cases with subbasal and rarely also with basal cell. Portion of M limiting discal cell inserted on Sc+R; base of discal cell connected to Sc+R by a short oblique cross vein. Hind wings with hamus and m-cu cross vein well developed, rarely without hamus and Cu connected directly to Sc+R by a simple cross vein. Anal lobe at least about half as long as hind wing, rarely shorter or altogether absent; apex of anal lobe distinctly lobulate.

Basal abdominal tergite with or without spine. Last tergite of male covering genitalia from above or not. Phallotheca from subcylindrical to globular, largely membranous; endosoma divided into conjunctiva and vesica, latter bifid and with two frequently very elongated arms, each containing a branch of ductus seminis, and with a gonopore at its apex; conjunctiva and vesica frequently with processes. Female genitalia with third gonapophyses fused into a syngonapophysis, latter reduced, membranous or only slightly sclerotized, transverse, glabrous or with a few setae.

Male: Testes fusiform, composed of seven or fewer follicular lobes. Seminal vesicles consisting of abrupt globular swelling of vasa deferentia. Mesadenia large, of various complex shapes.

Female: Capsula seminalis vermiform appendage followed by a rather wide glandula apicalis not significantly longer than capsula. Pseudospermathecal ducts very elongate, often with terminal ampoule.

TYPE GENUS: *Empicoris* Wolff (as *Ploiariola* Reuter).

DISTRIBUTION: All zoogeographical regions; no endemic genera in Australian and Ethiopian regions (except Madagascar).

KEY TO THE GENERA OF THE PLOIARIOLINI

1. Micropterous or apterous (figs. 120A; 123A, C) 2
   Fully winged 3
2. Long spines present on under surface of head, upper surface of rostrum and on fore coxae (fig. 123G, H) . . . . . *Saicella*
   Spines mentioned lacking . . . *Nesidiolestes*
3. Forewings lacking a closed cell at or near base of large discal cell, thus with only one closed cell (figs. 102E; 105F; 106N; 107K; 115L; 116J; 118E; 119I; 122M; 125K) . 4
   Forewings with one or two small cells at or near base of large discal cell, thus with two or three closed cells (figs. 104S; 106D;

108H; 111Q; 126I) 13

4. Two longitudinal veins emitted from base of discal cell in addition to short vein connecting region of base of cell to wing margin, one free ending, one attaining axillary region (figs. 105G; 106M; 116J; 119I) . . 5

Only one longitudinal vein emitted from base of discal cell in addition to veinlet connecting cell to wing margin (figs. 102E; 107K; 115L; 118E; 122M) 9

5. Scutellum spined (figs. 105B; 116A) . . . 6

Scutellum lacking spine (figs. 106A; 119A; 125A) 7

6. First abdominal tergite spined (fig. 105K); spines of fore femur shorter than diameter of article (fig. 105C); surface of forewing smooth, flat (fig. 105G); hind wings with hamus (fig. 105F) . . . . . *Calphurniella*

First abdominal tergite not spined (fig. 116A); spines of fore femur partly as long as diameter of article (fig. 116D); surface of forewing rugose, carinulate, region of discal cell bullate (fig. 116A); hind wing lacking hamus (fig. 116M) . . . *Hybomatocoris*

7. Base of forewings with conspicuous, longitudinal, dark markings (fig. 106D, J, M); hind wings lacking pattern elements. Head, thorax, and abdomen almost uniformly brownish or yellowish; discal cell of forewing more than twice as long as its maximum width, apical portion conspicuously narrowed (fig. 106D, J) . . *Calphurnioides*

Base of forewings lacking conspicuous longitudinal markings, hind wings with pattern elements (figs. 119G; 125F). Head, thorax, and abdomen with conspicuous light and dark markings; discal cell of forewings not more than twice as long as its maximum width, its apical portion not conspicuously narrowed (figs. 119I; 125K) 8

8. Metanotum with a short spine (fig. 119A); forewings with smooth surface, Cu with a double curve along discal cell (fig. 119I); hind wing with hamus (fig. 119G) . . . . . *Mesosepis*

Metanotum lacking spine (fig. 125B); forewing embossed, Cu with a simple curve along discal cell (fig. 125K); hind wing with reduced venation, hamus lacking (fig. 125F) . . . . . *Sepimesos*

9. Distance from apex of pterostigma to tip of forewing about as large as, or larger than, distance from apex of pterostigma to insertion of M on same (figs. 107K; 114L; 115L); base of discal cell shortly truncate, basal half of anterior border of cell distinctly separate from wing margin, connected to it by two oblique cross veins (figs. 107K; 114L; 115L); fore tarsi two-segmented (fig. 107I; 115C, F) 10

Apex of pterostigma carried much farther toward wing tip, or even attaining same (figs. 102B; 118E; 122M); base of discal cell narrowly pointed, anterior border of cell fused for most of its extension to anterior wing margin, free at extreme base only and there connected to wing margin by one cross vein only (figs. 102B; 118E; 122M); fore tarsi three-segmented (figs. 103C, G; 118F, I; 122C, J) 11

10. Head, thorax, and basal abdominal sternite glabrous, polished; pronotum not carinate laterally (fig. 107B); wing pattern formed by large vittae (fig. 107K) . . . *Ctydinna*

Head, thorax, and basal abdominal sternite dull as rest of body, with short, adpressed pubescence; pronotum with distinct, generally extensive, lateral carinae (fig. 114U, V); wing pattern formed by numerous small spots (fig. 115L) . . . . . *Empicoris*

11. Scutellum spined (fig. 102A); pterostigma attaining wing tip (fig. 102C) 12

Scutellum lacking spine (fig. 122B); pterostigma falling short of wing tip (fig. 122M) . . . . . *Panamia*

12. Metanotum rounded apically (fig. 102D), or with a very short process only (fig. 102L); pronotum with lateral carina figs. 102L; 103B) . . . . . *Ademula*

Metanotum with a distinct slender spine (fig. 118C); pronotum not carinate laterally . . . . . *Malacopus*

13. A small subquadrate or subtriangular cell situated laterad of inner basal angle of discal cell (figs. 104C, S; 111Q) 14

A subrectangular or triangular cell situated basad of large discal cell (figs. 106D; 126I) 15

14. Fore tarsus about one-third as long as tibia (fig. 104H); some of spines of fore femur as long as diameter of segment (fig. 104I); hind wings lacking hamus (fig. 104R) . . . . . *Bironiola*

Fore tarsus at most one-fourth as long as tibia (fig. 111G); spines of fore femur invariably much shorter than diameter of article (fig. 111C); hind wings with hamus (fig. 111S) . . . . . *Emesopsis*

15. Whitish or stramineous species with distinct dark pattern elements on body and appendages. Fore femur frequently with dorsal bristle tufts (fig. 126T); scutellum spined (fig. 126R); second rostral segment not or only slightly shorter than first (fig. 126G, L); subbasal cell short, triangular (fig. 126I); male pygophore normal in size (fig.

126H, Y) . . . . . *Tridemula*

Brownish species, lacking distinct pattern elements, with exception of dark markings on forewings and occasional annulations on legs. Fore femur not with bristle tufts; scutellum not spined (fig. 106A); second rostral segment only half as long as first (fig. 106B, O); subbasal cell very elongate, virtually rectangular (fig. 106D); male pygophore very large, occupying about one-third of total length of abdomen . . *Calphurnioides*

ADEMULA McAtee and Malloch

Ademula McAtee and Malloch, 1926, p. 125.

Description: Macropterous. Small species (5–7 mm.).

Body surface partly dull, partly shining, with short and long hairs, but lacking woollike pile. Basic color whitish to stramineous, legs and antennae sparsely annulated with dark, head and thorax with generally faint, forewings with more or less conspicuous, pattern elements, those of forewings forming simple spots.

Head short, anteocular and postocular portions of identical length, both elevated dorsally. Anteocular with sides subparallel in dorsal view; postocular subsemiglobular in dorsal and lateral aspects. Eyes large. Rostrum conspicuously bent between first and second segment; first stout, subvertical, second somewhat shorter and more slender than first, third slightly longer than second. Antenniferous tubercles large; antennae inserted near level of anterior border of head; first segment of antennae of male with, of female with or without, long hairs. Interocular furrow situated at or slightly before level of center of eyes. Dorsal surface of head with or without long hairs.

Pronotum completely covering mesonotum, distinctly constricted before middle; lateral carina present on anterior portion of hind lobe. Fore lobe as wide as, or wider than, long, its sides rounded or subparallel; disk posteriorly at center with a punctiform or oval depression; surface smooth, slightly shining. Posterior lobe of varied proportions, its sides distinctly diverging posteriorly, its surface punctate or delicately rugose. Scutellum and first abdominal tergite with a distinct spine, metanotum with a median longitudinal ridge and a very short projection, in some cases lacking. Pronotum with or without isolated long hairs.

Forelegs slender, with scarce or very numerous long hairs. Coxa and trochanter simple. Femur with two series of processes. Posteroventral series beginning near but not at base of article, composed of usually three, rarely four or five, relatively large spines, inserted on short, wartlike processes, and very numerous short denticles; large spines together with their bases much shorter than diameter of segment. Anteroventral beginning somewhat distad of posteroventral series, not interrupted at base, similar in composition to latter series. Fore tibia slender, four-fifths as long as femur; ventrally with two series of strong decurved setae. Fore tarsus about one-fifth as long as tibia, three-segmented, not heavily sclerotized, hairy on all surfaces, bristles of ventral surface rather stiff, especially on basal segment. First and second segment subequal in size, third somewhat shorter. Claws of identical size, inner one with medially incised ventral lamella, outer one simple, or with two small, pointed, subbasal projections. Mid and hind legs slender, posterior femora distinctly surpassing apex of abdomen. Femora with isolated long hairs; tibia with microchaetae and macrochaetae. First and second tarsal segments subequal in length, third somewhat shorter, all with very long setae. Third tarsal segment in some cases ventrally with not very numerous long, apically widened setae. Claws slender, either with a barely visible, medially incised, ventral lamella, or with basal portion of the latter large, triangular.

Surface of forewings smooth. One large discal cell present, truncate apically, pointed at base; basad of cell, M and Cu completely fused, attaining base of wing. Short vein connecting base of cell to Sc well developed. Pterostigma carried to apex of wing. Venation of hind wing complete; R+M not connected beyond cross vein, simple.

Abdomen elongate, very narrow at base in lateral and ventral view, distinctly widened caudad, widest at posterior third. Hind margin of basal sternite deeply incised. Surface of abdomen shining, covered with numerous microchaetae and isolated macrochaetae.

Male: Seventh tergite short, not projecting over genitalia. Eighth sternite fully visible,

broadly band-shaped in lateral view, its spiracle conspicuously projecting. Pygophore small, not occupying more than one-seventh of total length of abdomen, slightly to distinctly longer than high in lateral view; sclerotized dorsally for most of its length, posterior opening margined by row of spine-like setae. Process situated at posterosuperior, rarely at inferoposterior, border, spine- to knob-shaped. Parameres relatively short, straight, with sparse, simple setae. Articulatory apparatus subquadrate. Phallotheca membranous or slightly sclerotized, dorsally with a saddle-shaped distinctive sclerotization. Vesica arms short to very elongate, entirely membranous or with apical narrowed portion strongly sclerotized.

Female: Eighth and ninth tergite hood-shaped, rounded posteriorly. Gonocoxites and gonapophyses like those of *Malacopus*. Syngonapophysis not sclerotized.

TYPE SPECIES: *Ademula reticulata* McAtee and Malloch (by original designation).

DISTRIBUTION: Oriental, Australian, and Ethiopian regions.

OBSERVATIONS: This genus is a vicariant, geographically as well as taxonomically, of the Neotropical *Malacopus*; both are closely related. The differential characters given in the generic key (presence or absence of lateral carinae of pronotum; condition of metanotum) by themselves would not be sufficient to warrant generic separation; the male genitalia, however, are sufficiently distinct for the maintenance of *Ademula*. In the latter genus, we do not find the 2+2 longitudinal, rodlike sclerites of the phallotheca that exist in all species of *Malacopus*. The saddle-like sclerotization of the dorsal phallotheca wall of *Ademula* is lacking in the American genus.

It is interesting to note that the species that lack long hairs on the dorsal surface of the head and pronotum (*distincta*, *gressitti*, and *peregrinator*) possess modified setae on the under surface of the third segment of the mid and hind tarsi (fig. 103K–M), with the basal portion of the medially incised ventral lamella of the respective claws being large. Among the species that have long hairs on the head and pronotum and that could be examined, *abluta*, *reticulata*, and *schoutedeni* lack the specialized setae mentioned, and the medially incised lamella is very low. In *reticulatoides*, the lamella is low, but the setae of the third tarsal segment are modified as in the first group.

The following specific key is based on external characters only. Whenever feasible, identifications should be checked by an examination of the male genitalia. A considerable number of undescribed species is before me.

KEY TO THE SPECIES OF *Ademula*

1. Head and pronotum bare above 2
   Head and at least anterior lobe of pronotum with long hairs (fig. 102A, I) 4
2. Pattern of forewings composed of rather irregularly arranged spots; basal third of discal cell mostly free of spots (fig. 102C) . . . 3
   Pattern of forewings composed of spots arranged into a distinctive longitudinal band; basal third of discal cell mostly taken up by spots (fig. 103 O) . . . . . *peregrina*
3. Spots in discal cell of forewing forming a continuous series along Cu (fig. 102C) . . . . . *gressitti*
   Spots in discal cell of forewing forming a series along Cu which is interrupted on basal third of cell . . . . . *distincta*
4. Dark markings of forewing intersected by reticulating white lines (fig. 102E, J) . . . 6
   Dark markings of forewings not intersected by such lines (fig. 102B) 5
5. Forewings with a nearly percurrent, dusky bluish vitta . . . . . *nubecula*
   Forewings with isolated spots and a few narrow, band-shaped vittae (fig. 102B) . . . . . *austrina*
6. Virtually whole surface of forewings occupied by dark markings (fig. 102J). Hind lobe of pronotum dark brown, with yellowish spots (fig. 102I) . . . . . *schoutedeni*
   Considerable areas of forewing free from dark markings (fig. 102E). Hind lobe of pronotum stramineous 7
7. Dark markings of apical two-thirds of forewings forming a distinct hourglass-shaped pattern, connected to dark markings of basal third of forewings by continous pattern elements (fig. 102E). Forelegs relatively stout, length of femur less than 10 times its maximum width (fig. 102F) 8
   Dark markings of apical portion of forewings less compact, and not connected to basal markings. Forelegs more slender, length of femur at least 10 times its width 9
8. Subapical annulus of mid and hind femora almost imperceptible; spots of discal cell along Cu numerous, but isolated from one another . . . . . *reticulata*

Subapical annulus of mid and hind femora distinct; spots of discal cell along Cu forming a continuous, somewhat indented band (fig. 102E) . . . . . *reticulatoides*

9. Spots on forewing large, not numerous, scattered. Fore femur 11 times as long as maximum width. Mid and hind femora with apical annulus only . . . . . *abluta*

Spots on forewings numerous, large and small, occupying a larger total surface; fore femur 10 times as long as maximum width; mid and hind femora with one distinct apical annulus and three additional annuli along their whole length . . . . . *contaminata*

Ademula pauliani (Villiers) could not be included in the key because of insufficient data available for this species.

Ademula abluta McAtee and Malloch

Ademula reticulata var. *abluta* McAtee and Malloch, 1926, p. 126.

The specimens described by McAtee and Malloch as var. *abluta* seem sufficiently distinct from the nominal form to merit specific rank.

Material Examined: Malaya: Kuala Lumpur, Ulor Klang, December 20, 1937 [British Museum (Natural History)], one female.

Distribution: Philippines; Malaya.

Type: Female, United States National Museum.

Ademula austrina Wygodzinsky

Figure 102A, B

Ademula austrina Wygodzinsky, 1956, p. 210, figs. 117–120.

The head, thorax, and forewing are illustrated here.

Distribution: Australia (Queensland).

Type: Female, British Museum (Natural History).

Ademula contaminata (Distant), new combination

Ploiariola contaminata Distant, 1903c, p. 258, pl. 16, figs. 1, 1a.

The characters used in the key were taken from the specimen mentioned below.

Material Examined: Ceylon: Paradeniya, December, 1901 [British Museum (Natural History)], one female.

Distribution: Malaya; Ceylon.

Type: British Museum (Natural History).

Ademula distincta Usinger

Figure 102D, G

Ademula distincta Usinger, 1946, p. 43, figs. 8a, 8b.

I reproduce here, in addition to the original illustration of the general aspect (fig. 102D), the drawing of the apical portion of the phallus of the species (fig. 102G) from Wygodzinsky and Usinger (1960).

Distribution: Mariana Islands.

Type: Male, Bernice P. Bishop Museum.

Ademula gressitti Wygodzinsky and Usinger

Figure 102C, K, N

Ademula gressitti Wygodzinsky and Usinger, 1960, p. 263, figs. 15a–15i.

The illustrations used in the present paper were taken from the original description.

Distribution: Caroline Islands.

Type: Male, United States National Museum.

Ademula nubecula McAtee and Malloch

Ademula nubecula McAtee and Malloch, 1926, p. 126, fig. 25.

Distribution: Borneo.

Type: Male, United States National Museum.

Ademula pauliani (Villiers)

Empicoris pauliani Villiers, 1949a, p. 286.
Ademula pauliani: Villiers, 1961, p. 40.

Distribution: Ivory Coast.

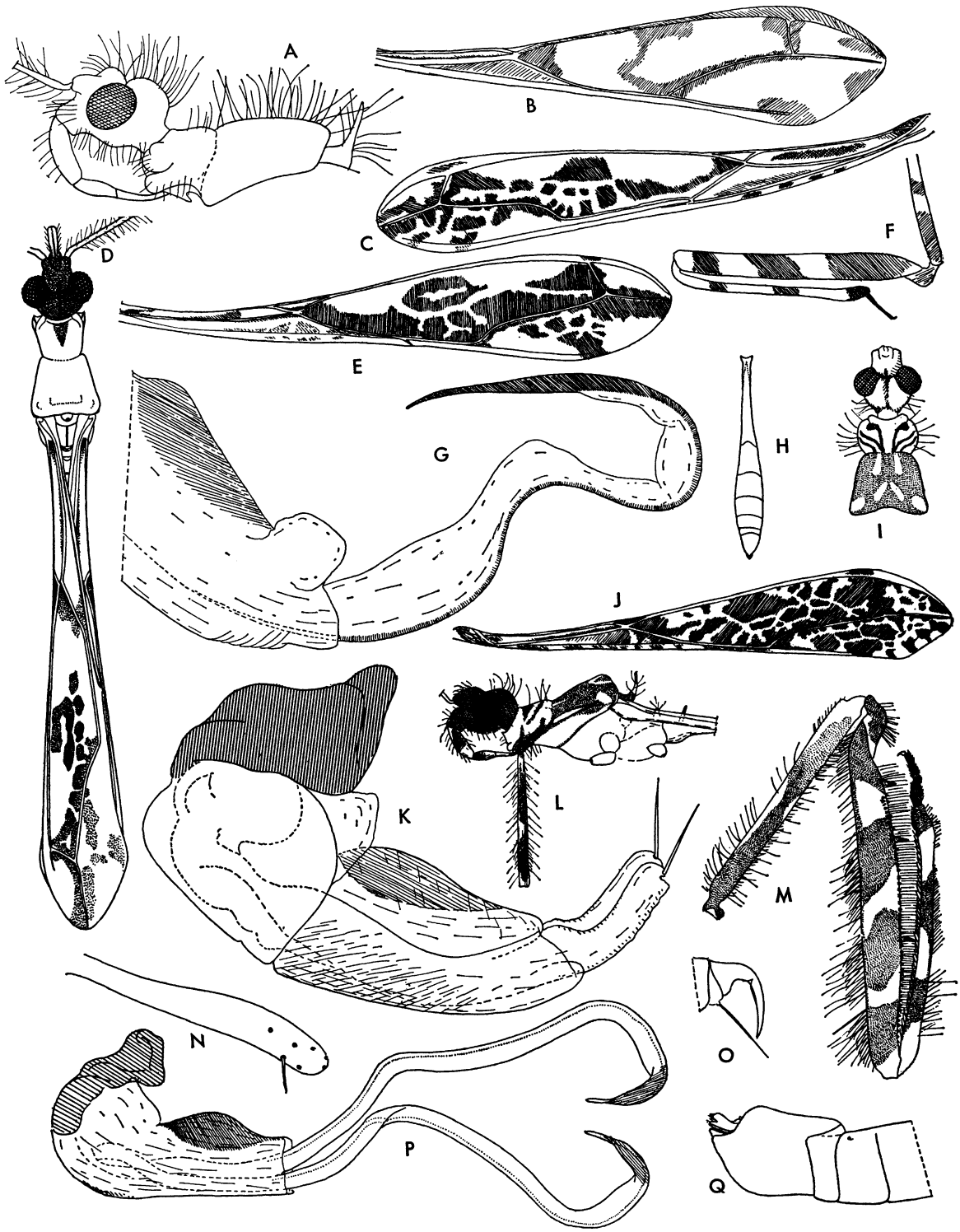
Type: Muséum National d'Histoire Naturelle.

Ademula peregrina, new species

Figure 103A–X

Description: Male: Length, 6.5 mm.

General body color ochraceous. Head lacking distinct pattern; posterior darker than anterior lobe, more conspicuously darkened along midline dorsally; also darkened anteriorly above insertion of rostrum, latter with a subbasal brownish annulus on first and another one on basal half of second segment. Antennae ochraceous, concolorous. Fore lobe of pronotum dorsally along middle with a median, anteriorly divided, fuscous stripe, also darkened at sides. Posterior lobe of pronotum concolorous dorsally, darkened laterally, just below shiny, flavescent, lateral carina. Scutel-


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q

lum and its spine of general body color, with 1+1 dark spots laterad of insertion of spine. Metanotum rufous. Spine of first abdominal segment fuscous. Lateral surface of mesothorax and metathorax of general body color, darkened along sutures; ventral surface stramineous. Forelegs stramineous, with faint brownish annuli as shown in figure 103C; tarsi darker. Mid and hind legs stramineous; femoral-tibial articulation narrowly white; femora with a broad, subapical, brownish annulus, tibiae with an extremely faint, narrow, subbasal, dark annulus. Forewings opaque white, veins yellowish, pattern elements fuliginous, their distribution as shown in figure 103 O. Abdomen coralline, basal half of generaly body color, fuscous at extreme base dorsally; pygophore stramineous.

Head and rostrum as shown in figure 103A, B; distance between eyes dorsally four-fifths of their width; in lateral view eyes almost attaining level of dorsal and ventral surface of head. Long hairs of head lacking. First antennal segment with numerous long hairs, their length up to three times diameter of segment. Length of first segment, 3.8 mm.; relative length of segments, 1/1/0.45/0.16.

Prothorax as shown in figure 103A, B; lacking conspicuous long hairs. Fore lobe shiny, microscopically reticulate; hind lobe coarsely punctate-rugose. Spine of scutellum large, at least as long as scutellum. Metanotum bare, its posterior projection hardly perceptible. Spine of first abdominal tergite well developed.

Shape of forelegs as shown in figure 103C; lacking long hairs. Coxa as long as pronotum. Femur 11 times as long as wide. Posteroventral series composed of three large spines, length of which, together with their bases, about one-third of diameter of femur; five spinulets between first two and a similar number between second and third large spines. Anteroventral series composed of about 40 small and very small spines, a larger spine at base of series (fig. 103D). Tibia and tarsus as given in generic description and shown in figure 103C, G. One claw of forelegs with a medially incised ventral lamella, other lacking any ventral projections (fig. 103H, I). Mid and hind legs as given in generic description and shown in figure 103E, F, K–M; posterior femora surpassing apex of body by 1 mm. Third tarsal segment ventrally with not very numerous modified, apically widened setae (fig. 103K, L). Basal portion of medially incised ventral lamella of mid and hind claws large, triangular (fig. 103M).

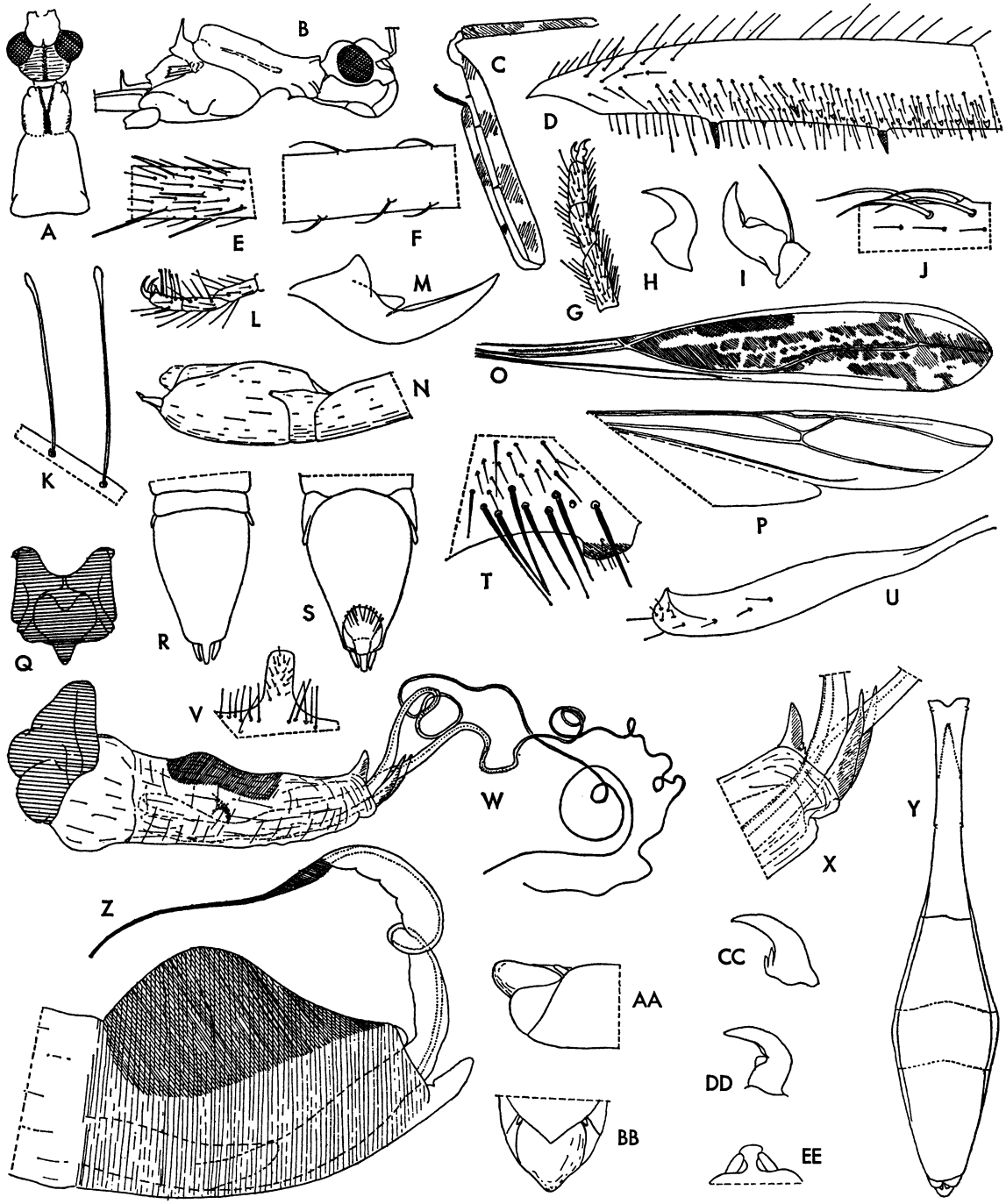
Shape and venation of fore and hind wings as shown in figure 103 O, P.

Abdomen as given in generic description, and similar to figure 102H. Pygophore occupying about one-seventh of total length of abdomen, distinctly longer than high in lateral view (fig. 103N); dorsal and ventral aspect as shown in figure 103R, S. Posterosuperior process subhorizontal, narrow, truncate apically, its chaetotaxy as shown in figure 103V. Shape and chaetotaxy of parameres as shown in figure 103U. Phallus as shown in figure 103Q, W, X, characterized by a single hook-shaped, endosomal sclerotization, one dorsal and 1+1 ventral guidelike projections at phallosoma mouth and elongate filiform apical portions of vesica arms.

MATERIAL EXAMINED: Madagascar: Rogez District, 800 meters (Lambeston; the American Museum of Natural History), one male holotype.

OBSERVATIONS: The male genitalia of *A. peregrina* are very distinctive and sufficient to characterize the species.

FIG. 102 (OPPOSITE PAGE). A, B. *Ademula austrina*. A. Head and thorax, lateral view. B. Forewing, with color pattern. C. *Ademula gressitti*, forewing, with color pattern. D. *Ademula distincta*, general aspect, with color pattern. E, F. *Ademula reticulatoides*. E. Forewing, with color pattern. F. Foreleg, with color pattern; spines not shown. G. *Ademula distincta*, phallotheca and endosoma, lateral aspect; only one vesica arm shown. H–J. *Ademula schoutedeni*. H. Abdomen of male, ventral view. I. Head and pronotum, dorsal view, with color pattern. J. Forewing, with color pattern. K. *Ademula gressitti*, phallus, lateral aspect. L, M. *Ademula schoutedeni*. L. Anterior portion of body, lateral view, with color pattern shown except on mesopleura and metapleura. M. Foreleg, with color pattern. N. *Ademula gressitti*, paramere. O–Q. *Ademula schoutedeni*, male. O. Claw of hind leg. P. Phallus, lateral view, vesica arms somewhat twisted. Q. Apex of abdomen, lateral view. (D taken from Usinger, 1946.)


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE

Ademula reticulata McAtee and Malloch

Figures 13J; 103Y, Z, AA–EE

Ademula reticulata McAtee and Malloch, 1926, p. 125, figs. 23, 24.

The posterosuperior border of the pygophore of the male holotype is illustrated (fig. 103EE). The phallus of the male from Poespoe, Java (fig. 103Z), is rather similar to that of *austrina*, but differs by the larger saddle-shaped sclerotization of the phallotheca, and the more slender and slightly differently shaped, apical, sclerotized portion of the endosoma projections. The genitalia of the female are shown in figure 103AA, BB; the spermatheca is illustrated in figure 13J.

Material Examined: Java: Poespoe, 1914 (F. Muir; the California Academy of Sciences), one male. Pasoeroean, March and April, 1914 (F. Muir; the American Museum of Natural History), one male; (F. Muir; the California Academy of Sciences), one female.

Distribution: Singapore; Borneo; Java.

Type: Male, United States National Museum.

Ademula reticulatoides Wygodzinsky and Usinger

Figure 102E, F

Ademula reticulatoides Wygodzinsky and Usinger, 1960, p. 262, figs. 15a–15d.

Distribution: Caroline Islands.

Type: Female, United States National Museum.

Ademula schoutedeni Wygodzinsky

Figure 102H–J, L, M, O–Q

Ademula schoutedeni Wygodzinsky, 1954a, p. 569, figs. 1–11.

Some of the original illustrations are reproduced here for comparison. Even though the description of the other named African species, *pauliani* (Villiers), is very short, there is no doubt that one is quite different from the other.

Distribution: Sierra Leone.

Type: Male, British Museum (Natural History).

Ademula sp.

I have seen three specimens of an undescribed species of *Ademula* from Bwamba, Uganda, but their state of preservation makes their description inadvisable at this time. Superficially, the specimens are very similar to *reticulata* and *reticulatoides*.

BIRONIOLA Horváth

Bironiola Horváth, 1914a, p. 639.

Description: Macropterous. Small species (3–4 mm.).

Body surface partly dull, partly shining, covered with short and long setae, wool-like adpressed pile on head and thorax. Body and legs unicolorous, forewing with dark and light pattern elements.

Head short, fusiform in lateral view; postocular portion longer than anteocular, its sides rounded in dorsal and lateral view. Eyes small to large. Rostrum not distinctly bent between first and second segments; first attaining level of center of eye; second about half as long as first, distinctly swollen; third about as long as second. Antennae inserted near anterior border of head, remote from eyes. Interocular furrow backwardly curved, slightly surpassing level of posterior border of eyes.

Pronotum completely covering mesonotum, distinctly constricted at about middle; anterior lobe subglobular, posterior lobe sub-

Fig. 103 (opposite page). A–X. *Ademula peregrina*, male. A. Head and prothorax, seen from above, with color pattern. B. Head and thorax, lateral view. C. Foreleg, with color pattern. D. Base of fore femur. E. Portion of posterior tibia. F. Portion of posterior femur. G. Fore tarsus. H, I. Claws of foreleg. J. Portion of under surface of fore tibia. K. Capitate setae of third segment of posterior tarsus. L. Posterior tarsus. M. Claw of hind leg. N. Apex of abdomen, lateral view. O. Forewing, with color pattern. P. Hind wing. Q. Articulatory apparatus. R. Genital region, seen from below. S. Genital region, seen from above. T. Detail of margin of posterior opening of pygophore. U. Paramere. V. Posterior process of pygophore, high magnification. W. Phallus. X. Apical portion of phallotheca. Y, Z, AA–EE. *Ademula reticulata*. Y. Abdomen of female, seen from below. Z. Phallotheca and endosoma, lateral view; only one vesica arm shown (specimen from Java). AA. Apex of abdomen of female, lateral view. BB. Genital region of female, dorsal aspect. CC, DD. Claws of foreleg. EE. Apex of pygophore, type specimen.

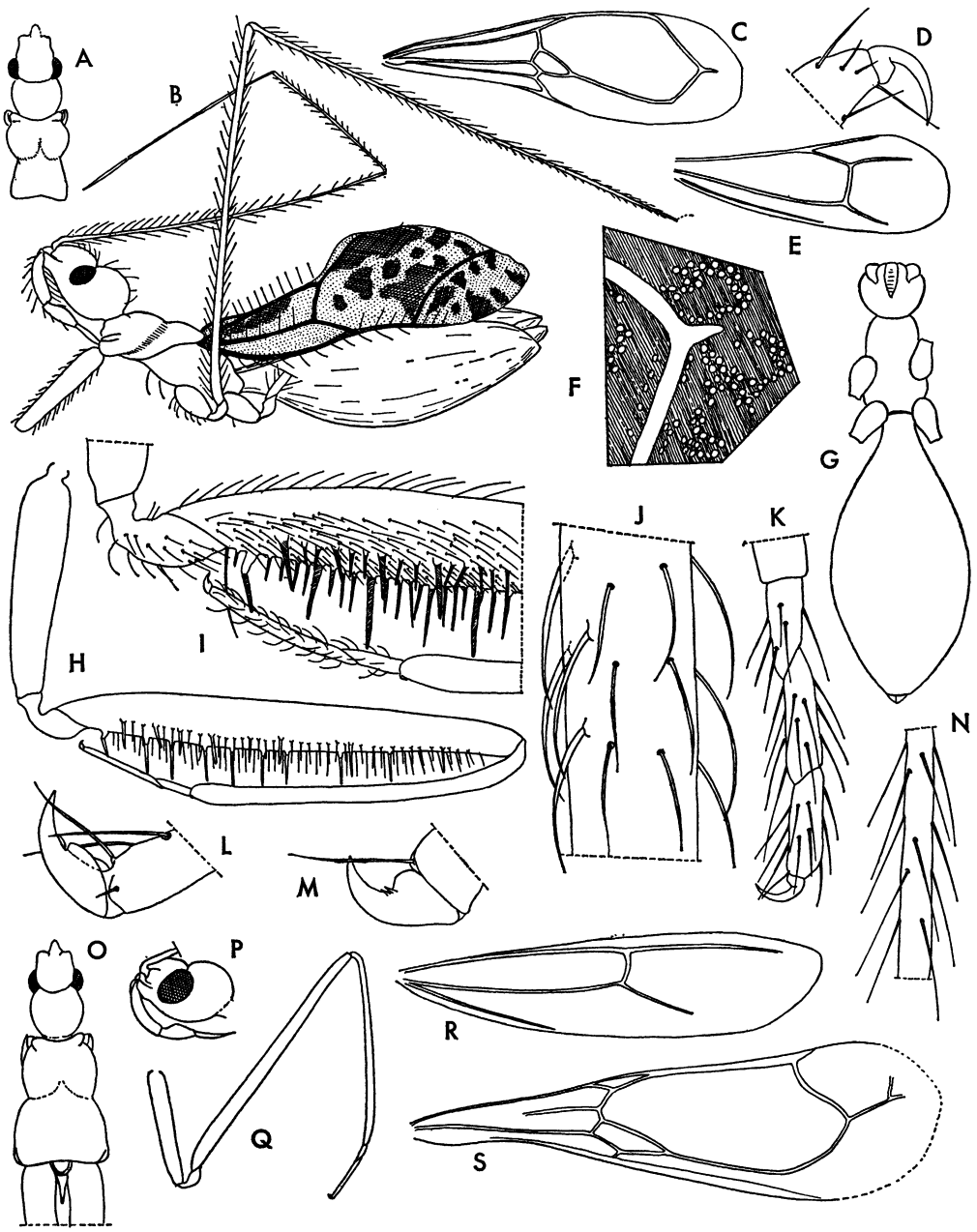


FIG. 104. A–N. *Bironiola bullata*. A. Head and prothorax, dorsal view. B. Female, lateral view, pattern shown on forewing only, latter slightly lifted. C. Forewing, schematic. D. Apex of tarsus and claw of foreleg. E. Hind wing. F. Detail of surface of forewing, high magnification. G. Thorax and abdomen of female, seen from below. H. Foreleg. I. Detail of foreleg. J. Portion of fore tibia, under surface to left. K. Posterior tarsus. L. Apex of fore tarsus, with inner claw. M. Apex of fore tarsus, with outer claw. N. Portion of posterior femur. O–S. *Bironiola mendosa*. O. Anterior portion of body, dorsal view. P. Head, lateral aspect. Q. Outlines of leg. R. Hind wing. S. Forewing.

rectangular, widened posteriorly, its sides rounded. Scutellum simply rounded behind; metanotum spined, first abdominal tergite simple.

Forelegs stout to slender. Coxa and trochanter simple. Femur with two series of slender spines inserted on short, wartlike tubercles, each series composed of a moderate number of long (about as long as diameter of segment) and numerous interspersed, shorter spines. Posteroventral series beginning at base of article; spines not transformed into short teeth apically. Anteroventral series beginning slightly beyond base of article, not interrupted. Tibia slender, two-thirds as long as femur, hairs of ventral surface somewhat stouter than remainder. Tarsi very long and slender, one-third as long as tibia, two-segmented, basal segment about half as long as apical. Two subequal claws, inner one with a medially incised, ventral lamella, outer one with two tiny, pointed, median processes. Mid and hind legs slender, posterior femora surpassing apex of abdomen; all femora with simple setae only. Tarsi of mid and hind legs composed of three subequal segments. Claws slender, wide at base, abruptly narrowed beyond, apparently lacking ventral projections.

Fore and hind wings microscopically areolate throughout, their surface slightly rugose. Forewings with one large discal cell and one irregularly rectangular basal cell situated laterad of base of discal cell; M free basad of cells, evanescent or attaining base of wing. Short, basally directed vein connecting anterosuperior angle of discal cell to Sc absent or present. Pterostigma remote from apex of forewing. Apical portion of M with or without branch directed toward costal margin. Hind wing strongly reduced. Hamus and anal lobe lacking. Only two simple longitudinal veins basad and apical of large cross vein; a free branch of Sc present in one species.

Abdomen short and stout, narrowed at base. Hind margin of first abdominal sternite straight.

TYPE SPECIES: *Bironiola bullata* Horváth (by original designation).

DISTRIBUTION: New Guinea.

OBSERVATIONS: Horváth (1914) described the fore tarsi of *Bironiola* as three-segmented. An examination of the type specimens has shown that they possess two-segmented tarsi, although they are conspicuously longer than is usual for the tribe.

The two species included in *Bironiola* (*bullata* and *mendosa*) differ by many rather basic characters, as is evident from the key below. Because of the large interspecific variability in the related *Emesopsis*, a generic separation of the two species of *Bironiola* is not suggested at the present time.

KEY TO THE SPECIES OF *Bironiola*

Size, 3–3.3 mm. Fore femur 11 times as long as maximum width. Forewings bullate; M attaining base of wing (fig. 104C); no forwardly directed small vein connecting anterobasal angle of discal cell with costal margin; hind wing as shown in figure 104E . . . . *bullata*

Size, 4 mm. Fore femur about 18 times as long as maximum width. Forewings normal, not bullate. M evanescent before base of wing (fig. 104S); an oblique cross vein connecting anterobasal angle of discal cell with costal margin. Hind wing as shown in figure 104R . *mendosa*

Bironiola bullata Horváth

Figure 104A–N

Bironiola bullata HORVÁTH, 1914a, p. 639, fig. 1.

This species, the genotype, is figured here in detail. In several respects it is more specialized than *mendosa*, viz., in the shape and venation of the forewings and the reduction of the hind lobe of the pronotum. The antennal proportions are 1/0.5/0.53/0.22, virtually the same as those of *mendosa*.

DISTRIBUTION: New Guinea.

TYPES: One male, one female (no holotype designated), Hungarian National Museum.

Bironiola mendosa Horváth

Figure 104 O–S

Bironiola mendosa HORVÁTH, 1914a, p. 640, fig. 2.

A few figures made from the type specimen illustrate the main features of the species. The structural details and chaetotaxy of the legs are like those of *bullata*. The proportions of the antennal segments are 1/0.5/0.5/0.19.

DISTRIBUTION: New Guinea.

TYPE: One specimen (abdomen lacking), Hungarian National Museum.

CALPHURNIELLA, NEW GENUS

DESCRIPTION: Macropterous. Small species (4–6 mm.).

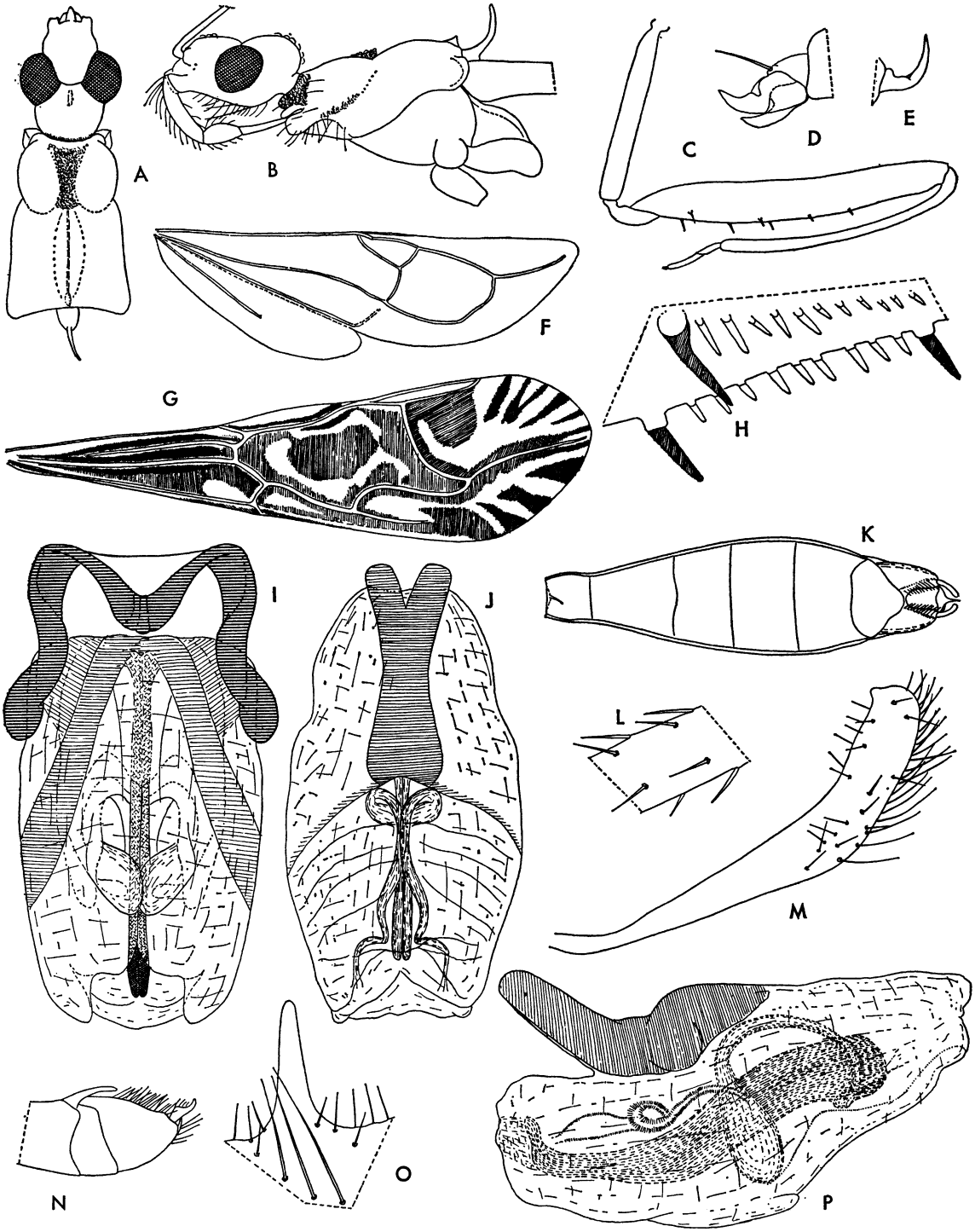


FIG. 105. *Calphurniella stheno*, male. A. Head and prothorax, seen from above. B. Anterior portion of body, lateral view. C. Foreleg. D. Praetarsus of foreleg, with claws. E. Claw of hind leg. F. Hind wing. G. Forewing, with color pattern. H. Base of series of fore femur. I. Phallus, ventral view. J. Phallus, dorsal aspect. K. Abdomen, seen from above. L. Portion of posterior femur. M. Paramere. N. Apex of abdomen, lateral view. O. Process of pygophore, high magnification. P. Phallus, lateral aspect.

Body surface partly dull, partly shining, with short and long hairs; head, thorax, and basal abdominal sternite with patches of inconspicuous, short, wool-like, adpressed pile. General color testaceous; head, body, and legs almost concolorous, forewings with striking pattern elements, hind wings not pigmented.

Head rather elongate, almost fusiform in lateral view. Postocular portion slightly shorter than anteocular, rounded behind in dorsal and lateral aspects. Eyes large. Rostrum bent between first and second segments; first attaining level of center of eyes, second half as long as first, slightly swollen; third slender, shorter than first. Antennae inserted nearer to anterior border of head than to eyes.

Pronotum completely covering mesonotum, slightly constricted before middle. Lateral carina lacking. Fore lobe shorter than wide, its sides rounded, disc divided longitudinally by a deep sulcus, each half of disk strongly convex. Posterior lobe longer than anterior, subrectangular, its sides slightly diverging posteriorly, its middle with a faint longitudinal depression. Scutellum, metanotum, and first abdominal tergite each with a spine.

Forelegs stout. Femur with two series of processes inserted on short, wartlike bases. Posteroventral series beginning near base; anteroventral series not interrupted at base; both composed of several larger and numerous small spines; larger ones generally shorter than, rarely as long as, diameter of segment. Tibia slender, about four-fifths as long as femur. Tarsi about one-fifth as long as tibia, two-segmented; basal shorter than apical segment. Claws subequal in size, each with a medially incised ventral lamella. Mid and hind legs short, femora hardly surpassing apex of forewings; bristles of femora uniformly short. Tarsal segments subequal in length; hairs moderate in number. Claws slender, curved, with a submedian incision.

Surface of forewings delicately pitted, dark regions in and near discal cell slightly embossed. Discal cell strongly narrowed apically, subtruncate at base; basal cell lacking. M and Cu free basad of discal cell, not connected to each other. Portion of Cu limiting discal cell, with a short, free branch. Pcu meeting discal cell apicad of base of cell, connecting base of discal cell to costal margin. Pterostigma hardly surpassing level of apex of discal cell, remote from wing tip. Venation of hind wing complete; Cu joining apical portion of R+M, thus forming a closed cell beyond cross vein.

Abdomen rather short, moderately constricted at base. Basal sternite slightly swollen, its posterior margin straight.

Male: Seventh tergite projecting, covering base of genital segments from above. Eighth sternite fully visible, large. Pygophore semielliptical in lateral view, occupying one-fifth of total length of abdomen; posterosuperior process spinelike. Parameres simple, narrow at base, widened apically. Basal plates strongly diverging. Phallotheca membranous, barrel-shaped, with a band-shaped, dorsal sclerotization. Endosoma (not examined in evaginated condition) with 1+1 coiled membranous and 1+1 rod-shaped sclerotized structures.

Female: Eighth tergite very short, transverse; ninth inclined, about as long as wide.

TYPE SPECIES: *Ploiariodes stheno* Kirkaldy.

ETYMOLOGY: Diminutive of *Calphurnia*, a genus of the Emesinae.

DISTRIBUTION: Fiji.

OBSERVATIONS: *Calphurniella* is closely related to *Calphurnioides*, from which it differs by features that I consider sufficient for generic distinction. These characters are mainly the presence of spines on the scutellum and basal abdominal tergite, the very striking wing pattern, and the quite different phallus of the male. It might also be pertinent to mention that *Calphurniella* is found well outside the known range of *Calphurnioides*.

Calphurniella stheno (Kirkaldy), new combination

Figure 105A–P

Ploiariodes stheno KIRKALDY, 1908b, p. 373.

DESCRIPTION: Male and female: Length to apex of forewings, male, 5.5–5.75, female, 6.0 mm.

General color testaceous. Head generally dark brown. Rostrum more or less darkened, especially at base. Antennae testaceous, in some cases somewhat darkened. Thorax of general body color. Forelegs almost uniformly colored, femora almost imperceptibly annulate, tibia in some darkened on apical third.

Mid and hind legs uniformly stramineous. Forewings hyaline, cells on disc and along veins broadly yellowish brown; conspicuous dark fuliginous stripes on base of wing, at both sides of M and Cu along basal two-thirds of discal cell, as well as seven to 10 radiating dark stripes on apical fifth of wing (fig. 105G). Abdomen of general body color.

Head, rostrum, antennae, legs, sides of fore lobe of pronotum, and abdomen polished; hind lobe of pronotum smooth, dull. Moderately long hairs on under surface of head, rostrum, and forelegs; whitish wool-like pile on posterior border of head, anterior border of pronotum and along median depression of its fore lobe, spots on pleura, and basal abdominal sternite; posterior lobe of pronotum completely bare, rest of body with inconspicuous, short, isolated hairs.

Head as shown in figure 105A, B. Anteocular region moderately elevated dorsally; postocular shortly behind transverse furrow with a small longitudinal elevation, in some cases difficult to perceive. Eyes large; distance between them dorsally slightly shorter than their width (0.8/1) in both sexes; in lateral view, eyes not attaining level of ventral surface of head. Rostrum as shown in figure 105B. Antennae in both sexes with short hairs only. Length of first segment (female), 2.7 mm.; relative length of segments, 1/0.75/0.25/0.18.

Pronotum as shown in figure 105A, B. Fore lobe moderately elevated, with a deep, median, longitudinal sulcus. Hind lobe very faintly convex only, with a wide and shallow, median, longitudinal depression and a very narrow, median, longitudinal, elevated line which posteriorly ends in a small, laterally compressed, triangular elevation. Disc of scutellum elevated, spine large, slender, curved. Metanotal shorter than scutellar spine; spine of basal abdominal segment very short and slender.

Forelegs as given in generic description and shown in figure 105C, D, H. Coxa as long as pronotum. Large spines of femur somewhat variable in size, from one-third to one-half of length of diameter of segment, strongly pigmented. Small spines very uniform in size, hyaline. Posteroventral series with four large and about 50 small spines; large spines of anteroventral series three in number, small ones about 50. Tibia, tarsus, and claws as given in generic description and shown in figure 105C, D, H. Mid and hind legs as given in generic description. Femora rather strongly swollen basally, less conspicuously so at apex. Claws as shown in figure 105E. Hind femora variable in length, not reaching, or slightly surpassing, apex of forewings.

Shape and venation of forewings as shown in figure 105G, surpassing apex of abdomen by about 1 mm. Hind wings slightly shorter than forewings, reaching to apex of abdomen, their shape and venation as shown in figure 105F.

Abdomen fusiform, moderately narrowed toward base (fig. 105K). Last tergite covering base of pygophore only, subtriangular, rounded apically. Posterior process of pygophore spine-shaped, slender (fig. 105K, O). Shape and chaetotaxy of parameres as shown in figure 105M. Phallus as given in generic description and shown in figure 105I, J, P.

MATERIAL EXAMINED: Fiji: Ovalau: Thawathi, July 16, 1938, beating dead branches, 800 feet (E. C. Zimmerman; Bernice P. Bishop Museum), one female; Viti Levu: Rewa, 1906 (Muir; Bernice P. Bishop Museum), one male; Tholo-i-suva, July 21–25, 1938, 500 feet (E. C. Zimmerman; Bernice P. Bishop Museum), one male, one female; Mt. Korombamba, August 1, 1938, beating shrubs, 1300 feet (E. C. Zimmerman; Bernice P. Bishop Museum), one female; Nandarivatu, September 3, 1938, beating, 3700 feet (E. C. Zimmerman; Bernice P. Bishop Museum), one specimen without abdomen; no locality data (A. M. Lea; South Australian Museum), one male, one female; Belt Road, 18 miles west of Suva, July 22, 1938, beating shrubs (E. C. Zimmerman; Bernice P. Bishop Museum), one female.

OBSERVATIONS: The specimens examined agree very well with one another in all characters, with the exception of the individual from Nandarivatu, collected at a much higher elevation than the rest. It is only 4 mm. long, its forelegs are stouter and shorter (the coxa is only four-fifths of the length of the pronotum), and the larger spines of the fore femur are very long, the basal one attaining the length of the diameter of this segment. The very conspicuous pattern of the forewings, however, agrees completely with that of the

low-altitude specimens. As the abdomen is lacking, the genitalia could not be examined; thus it seems preferable just to list the specimen and mention its differences.

DISTRIBUTION: Fiji.

TYPE: Female, Bernice P. Bishop Museum.

CALPHURNIOIDES DISTANT

Calphurnioides DISTANT, 1913, p. 164.

Emesopsis (*Pseudobolos*) MCATEE AND MALLOCH, 1926, p. 119 (new synonymy).

Pseudobolos: WYGODZINSKY, 1954a, p. 571.

DESCRIPTION: Macropterous. Small species (4.5–7.2 mm.).

Body surface shining to polished, with short and scattered long hairs; head, thorax, and basal abdominal sternite with patches of inconspicuous, short, adpressed, wool-like pile. General color from stramineous to testaceous; body lacking conspicuous pattern elements, legs and antennae annulated in rare cases, forewings with more or less distinct pattern elements, invariably with longitudinal pigment stripes on basal half; surface of forewing slightly iridescent.

Head short; postocular region longer than anteocular, both moderately convex above. Anteocular with sides subparallel in dorsal view; postocular semiglobular in dorsal and lateral aspects. Eyes large. Rostrum bent between first and second segments; first attaining level of posterior border of eyes, subcylindrical; second about half as long as first, distinctly swollen; third slender, shorter than first. Antenniferous tubercles large, antennae inserted near anterior border of head. Antennae lacking long hairs. Interocular furrow strongly backwardly bent, situated at level of center of eyes.

Pronotum completely covering mesonotum, slightly constricted before middle. Lateral carina lacking. Fore lobe shorter than hind lobe, approximately as long as wide, with sides from almost straight to conspicuously rounded; disc with a small, longitudinal depression at center, along middle with a small area of adpressed, wool-like pile. Hind lobe of various proportions, from slightly to considerably longer than wide; disc with a more or less developed, median, longitudinal depression. Scutellum small, rounded posteriorly. Metanotum with a long spine; first abdominal tergite simple.

Forelegs stout. Femur with two series of processes. Posteroventral series beginning at or very near base of segment, composed of several larger and numerous very short spines inserted on short, wartlike bases; larger processes invariably much shorter than diameter of article. Anteroventral series beginning slightly distad of posteroventral series, not interrupted at base, similar in structure to other series. Fore tibia slender, three-fourths to four-fifths as long as femur; ventrally with two series of strong, decurved setae. Fore tarsus one-fourth to one-fifth as long as tibia, two-segmented; basal segment slightly to distinctly shorter than apical. Claws subequal in size; inner one with a medially incised ventral lamella, outer one with three to four small, pointed processes on basal half below. Mid and hind legs short, posterior femora hardly surpassing apex of body. Femora with short or long hairs; tibiae with microchaetae and macrochaetae. Tarsal segments subequal in length; hairs moderate in number, third segment in some cases having a few apically widened setae ventrally. Claws slender, simple.

Surface of forewings smooth. Large discal cell strongly narrowed apically, truncate at base; basal cell lacking; Cu and M free, basal of discal cell, in some cases connected by a transverse, veinlet-like spot seemingly forming a subbasal cell. Short vein connecting base of discal to costal margin. Pterostigma not projecting much beyond level of apex of discal cell, remote from wing tip. Hind wing with venation complete; R+M and Cu not connected beyond cross vein, simple.

Abdomen moderately narrow, broadly joined to thorax, somewhat constricted beyond base in lateral but not in ventral view. Basal sternite somewhat convex; its posterior margin slightly emarginated. Surface of tergites and sternites with microchaetae and macrochaetae; basal sternite with inconspicuous wool-like pile.

Male: Seventh tergite overlying base of genital segments. Eighth sternite fully visible, large. Pygophore from short, subsemicircular in lateral view to very elongate, much longer than high. Posterior process generally triangular, narrowly pointed or rod-shaped apically, rarely very short, crown-shaped. Parameres simple, rod-shaped, with short

hairs. Articulatory apparatus small, short; basal plates fused on their apical half. Phallotheca rarely membranous, in most cases heavily sclerotized, with a ventral, median, forwardly projecting tongue. Conjunctiva cylindrical, membranous, vesica arms narrowly coiled, bearing several projections.

Female: Eighth and ninth tergites simple in structure, subhorizontal. Gonocoxites large. Syngonapophysis strongly reduced.

TYPE SPECIES: Of *Calphurnioides*, *Calphurnioides elongatus* Distant (present designation); of *Emesopsis* (*Pseudobolos*), *Emesopsis* (*Pseudobolos*) *velutinervis* McAtee and Malloch (original designation).

DISTRIBUTION: Oriental, Australian, and Ethiopian regions.

OBSERVATIONS: Distant (1913) included two species in his description of *Calphurnioides*: *aberrans* and *elongatus*. No type species was designated. *Calphurnioides elongatus*, here designated type species, is clearly congeneric with *Emesopsis* (*Pseudobolos*) *velutinervis* McAtee and Malloch, 1926, the type species of *Emesopsis* (*Pseudobolos*) McAtee and Malloch, 1926; the latter thus becomes a synonym of *Calphurnioides*. *Aberrans* is transferred to *Emesopsis*.

Most of the species of *Calphurnioides* are very similar; they are characterized by the almost uniform dark color of the body and the peculiar male genitalia, with the rather elongate pygophore which bears an apically pointed process (fig. 106F, H) and the phallus as exemplified by figure 106G, K. A new species described in the present paper differs by its over-all stramineous color, the very short, crown-shaped, posterior process of the pygophore (fig. 106W, Z), and the apparently differently constructed phallus (fig. 106CC, EE, FF). The phallobase differs from that of the remaining species by being entirely membranous. The exact structure of the endosoma could not be examined, as complete eversion was not accomplished. The remaining structural characters and the unique pattern of the forewings agree in the new species and the formerly described species. If and when additional evidence becomes available, a subgeneric or generic separation might be considered, but at this moment it suffices to call attention to the presence of apparently two well-defined groups within *Calphurnioides*.

KEY TO THE SPECIES OF *Calphurnioides*

1. Over-all color of head and body dark brown to piceous; process of pygophore pointed apically (fig. 106F) 2
   Over-all color of head and body stramineous; process of pygophore crown-shaped (fig. 106W) . . . . . *gressitti*
2. Mid and hind femora simple 3
   Mid and hind femora slightly thickened at base and apex, more slender mesially, with three slight, beadlike swellings, one before and one beyond middle, other just before apex . . . . . *monoliferus*
3. Portions of M and Cu basad of discal cell free, neither joining nor connected by true or apparent cross veins (fig. 106M) . . . . . *velutinervis*
   These veins either joining or connected by true or apparent cross veins (fig. 106D, J) . . 4
4. Portions of R+M and Cu basad of discal cell apparently joining, forming an additional cell (fig. 106D); basal end of this cell not connected by pigment to costal margin of wing or to submarginal pigment stripe; first segment of antennae, as well as mid and hind legs, conspicuously annulated with light and dark . . . . . *australis*
   The veins mentioned not joining directly, but connected by one (fig. 106J) spot or several pigment spots or veinlike structures, and also connected by pigment to costal margin of wing or submarginal pigment stripe; first segment of antennae and mid and hind legs not annulated 5
5. M and Cu basad of discal cell connected to each other and to costal margin of wing by numerous apparent cross veins . . *elongatus*
   Not so 6
6. Veinlike submarginal pigment stripe of forewing connected to Cu basad of termination of R+M (fig. 106J) 7
   Veinlike submarginal pigment stripe of forewing not connected to Cu basad of termination of R+M . . . . . *emmesius*
7. Posterior border of hind lobe of head with 1+1 tufts formed by short hairs (fig. 106L); apical discal cell of forewings with three longitudinally arranged spots (fig. 106J) . . . . . *malkini*
   Posterior border of hind lobe of head lacking said tufts; apical discal cell of forewings with one longitudinal stripe . . . . *connexus*

Calphurnioides australis Wygodzinsky

Figure 106A–H

Calphurnioides australis WYGODZINSKY, 1956, p. 208, figs. 98–108.

DISTRIBUTION: Australia (Queensland); Moluccas.

TYPE: Male, British Museum (Natural History).

Calphurnioides connexus (McAtee and Malloch), new combination

Emesopsis (*Pseudobolos*) *connexus* MCATEE AND MALLOCH, 1926, p. 124, fig. 7.

DISTRIBUTION: Borneo.

TYPE: Male, United States National Museum.

Calphurnioides elongatus Distant

Calphurnioides elongatus DISTANT, 1913, p. 164, pl. 12, figs. 15, 15a.

DISTRIBUTION: Seychelles.

TYPE: Male, British Museum (Natural History).

Calphurnioides emmesius (McAtee and Malloch), new combination

Emesopsis (*Pseudobolos*) *emmesius* MCATEE AND MALLOCH, 1926, p. 125, fig. 8.

The male of this species has not been known before. The pygophore of the specimen examined for the present paper agrees well with that found generally in the genus. The phallus has not been examined.

MATERIAL EXAMINED: New Guinea: West New Guinea: Waigeu, Camp Nok, April, 1938, 2500 feet [L. E. Cheesman; British Museum (Natural History)], one male.

DISTRIBUTION: Philippines; New Guinea.

TYPE: Female, United States National Museum.

Calphurnioides gressitti, new species

Figure 106N–Z, AA–FF

DESCRIPTION: Male and female: Length, 4.5 mm.

General color stramineous. Mesopleura and metapleura fuscous. Forewings semihyaline, iridescent; discal cell and apical portion of wing with faint dark markings as shown in figure 106N; veins stramineous, M and Cu basad of discal cell fuliginous. Hind wings iridescent.

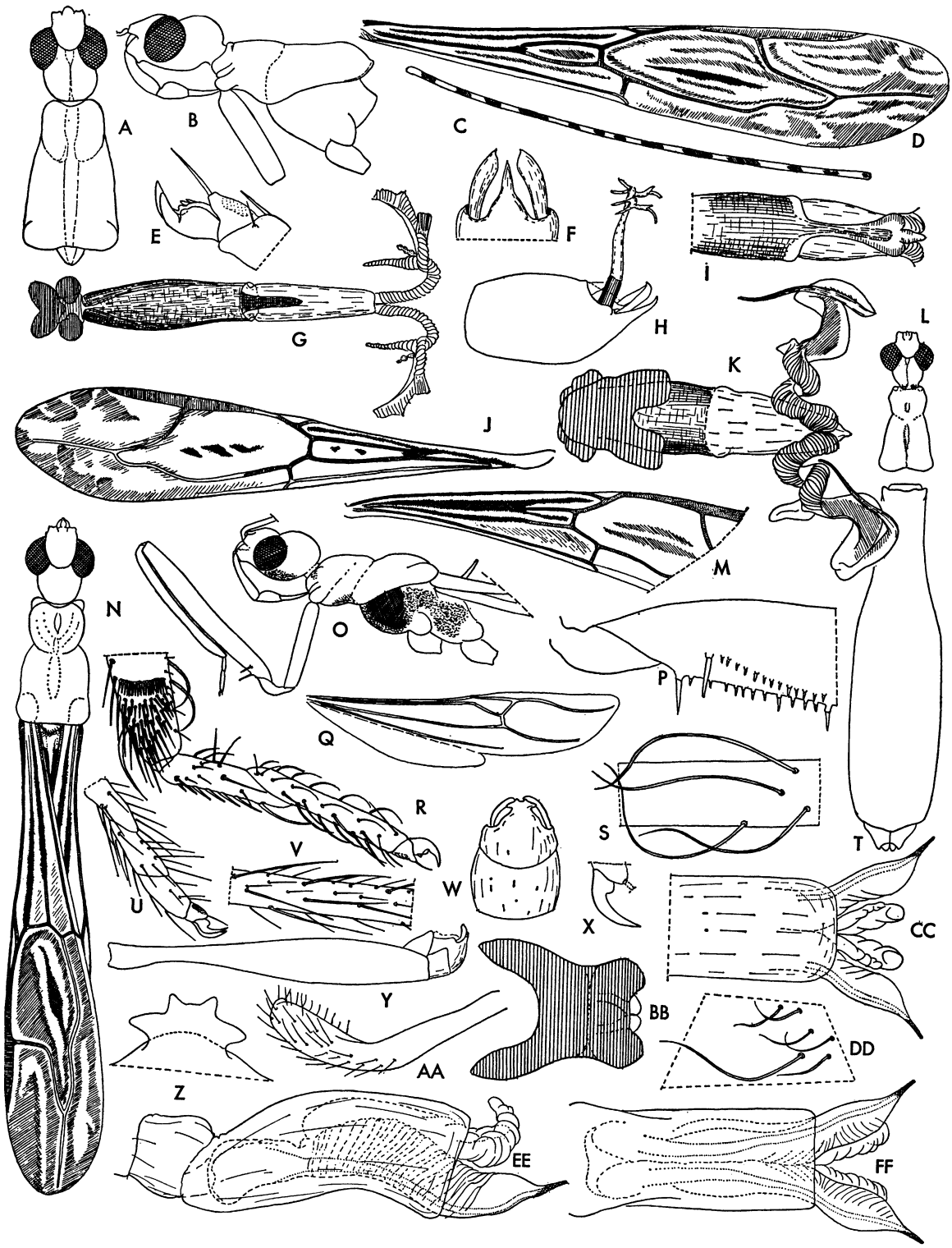
Body and appendages shining, mesopleura highly polished. Head, body, and legs with not very numerous long hairs. Short, sparse, wool-like, adpressed, white pubsecence on head ventrally and posteriorly, on fore margin and dorsally along middle of pronotum, on scutellum, on thorax ventrally, on posterior margin of mesopleura and on metapleura, and on basal abdominal segment.

Head as shown in figure 106N, O. Postocular region smooth dorsally. Interocular furrow situated somewhat behind level of center of eyes. Eyes large, their distance dorsally about equal to their width in both sexes; in lateral view eyes almost attaining level of inferior border of head. Rostrum as shown in figure 106 O. Hairs of antennae distinct, their length not surpassing diameter of segment, in both sexes. Length of first segment, 2.0–2.2 mm.; relative length of segments, 1/0.6/-0.43/0.19.

Thorax as shown in figure 106N, O. Fore and hind lobe smooth, with moderately numerous long hairs, each lobe with a shallow, median, longitudinal impression. Fore lobe slightly wider than long, hind lobe longer than wide. Scutellum and metanotum as given in generic description and shown in figure 106N, O.

Forelegs as given in generic description and shown in figure 106 O, P, R. Coxa four-fifths as long as pronotum, with long hairs dorsally and ventrally, latter also present on trochanter. Femur about eight times as long as its maximum width; ventral surface with numerous long hairs. Posteroventral series with four to five larger, and more than 40 small and very small, spines; anteroventral series with one large basal spine and about 20 small spines. Tibia three-fourths as long as femur. Tarsus one-fifth as long as tibia, its structure and chaetotaxy as shown in figure 106R. Claws subequal in size, their structure like that of *australis* (see fig. 106E). Posterior femur surpassing apex of forewings by 0.5 mm. Mid and hind femora slightly swollen at base and apex; long hairs not numerous, those of basal portion twice as long as diameter of segment (fig. 106S), decreasing in size toward apex of femur. Structure and chaetotaxy of tarsus of mid and hind legs as shown in figure 106U; claws simple (fig. 106X).

Forewings surpassing apex of abdomen by 0.5 mm.; their pattern and venation as shown in figure 106N. M and Cu basad of discal cell free, not connected to each other or to costal margin by pigment. Venation of hind wings as shown in figure 106Q.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF

Shape of abdomen as shown in figure 106T, Y; shortly pubescent, with interspersed longer hairs (fig. 106DD). First tergite lacking spine.

Male: Genital region as shown in figure 106W, Y. Pygophore small, occupying less than one-ninth of total length of abdomen, subsemicircular in lateral view. Posterior process very short, crown-shaped (fig. 106W, Z). Parameres simple, slightly curved (fig. 106AA). Phallus as shown in figure 106BB, CC, EE, FF. Articulatory apparatus as shown in figure 106BB. Phallobase subcylindrical, entirely membranous. Endosoma (not entirely evaginated in fig. 106CC, EE, FF) consisting of 1+1 projections which are pointed and somewhat sclerotized at apex, containing the vesica arms, and 2+2 shorter, distally rounded projections.

Female: Ventral aspect of genital region as shown in figure 106T.

MATERIAL EXAMINED: *New Guinea*: North-East New Guinea: Bubia, Markham Valley, September 19, 1955, 50 meters (J. L. Gressitt; Bernice P. Bishop Museum), one male; North-East New Guinea: Lae, July 6, 1957, 10 meters (D. Elmo Hardy; Bernice P. Bishop Museum), one female. *New Ireland*: Southwest, Giliugil Pl'n. [?Plantation], July 6, 1956, 2 meters (J. L. Gressitt; the American Museum of Natural History), one female.

OBSERVATIONS: This new species is named for J. L. Gressitt, in acknowledgment of his contributions toward a better knowledge of the entomology of the Pacific. Its unique characters are discussed above and are mentioned in the key.

Calphurnioides malkini (Wygodzinsky), new combination

Figures 2A; 4B; 106I–L

Pseudobolos malkini WYGODZINSKY, 1954a, p. 571, figs. 12–23.

A few figures taken from the original description are reproduced here.

DISTRIBUTION: British Cameroons.

TYPE: Male, the California Academy of Sciences.

Calphurnioides monoliferus (McAtee and Malloch), new combination

Emesopsis (*Pseudobolos*) *monoliferus* MCATEE AND MALLOCH, 1926, p. 124, fig. 16.

DISTRIBUTION: Philippines.

TYPE: Male, United States National Museum.

Calphurnioides velutinervis (McAtee and Malloch), new combination

Figure 106M

Emesopsis (*Pseudobolos*) *velutinervis* MCATEE AND MALLOCH, 1926, p. 124, fig. 9.

DISTRIBUTION: Philippines.

TYPE: Male, United States National Museum.

CTYDINNA, NEW NAME

Empicoris (*Dictynna*) CHINA, 1930, p. 150 (preoccupied by *Dictynna* Westwood, 1841, in Hymenoptera).

DESCRIPTION: Macropterous. Small species (5 mm.).

Body surface from shining to highly polished, bare or with short pilosity; conspicuous patches of long hairs on several regions of head and thorax. General color castaneous, antennae and legs narrowly annulated with whitish, forewings coarsely reticulated with whitish.

Head short, anteocular and postocular region of identical length. Anteocular with sides subparallel in dorsal view, postocular semi-

FIG. 106 (OPPOSITE PAGE). A–H. *Calphurnioides australis*, male. A. Head and prothorax, dorsal view. B. Anterior portion of body, lateral aspect. C. Mid femur, with color pattern. D. Forewing, with color pattern. E. Praetarsus and claws of foreleg. F. Apex of pygophore, seen from behind. G. Phallus, dorsal view. H. Pygophore, lateral aspect, phallus partly everted. I–L. *Calphurnioides malkini*, male. I. Apex of phallotheca, ventral aspect. J. Forewing, with color pattern. K. Phallus, dorsal aspect. L. Head and prothorax, seen from above. M. *Calphurnioides velutinervis*, basal portion of forewing, with color pattern. N–Z, AA–FF. *Calphurnioides gressitti*. N. General aspect of male, with color pattern. O. Anterior portion of body of male, lateral view, with pubescence; only basal spines of fore femur shown. P. Trochanter and base of fore femur. Q. Hind wing. R. Apex of tibia and fore tarsus. S. Portion of posterior femur. T. Abdomen of female, ventral view. U. Posterior tarsus. V. Portion of hind tibia. W. Eighth sternite and pygophore, seen from below. X. Claw of hind leg. Y. Abdomen of male, lateral view. Z. Process of pygophore, high magnification. AA. Paramere. BB. Articulatory apparatus. CC. Apical half of phallotheca, dorsal view. DD. Setae of pygophore. EE. Phallotheca, lateral view. FF. Phallotheca, seen from below.

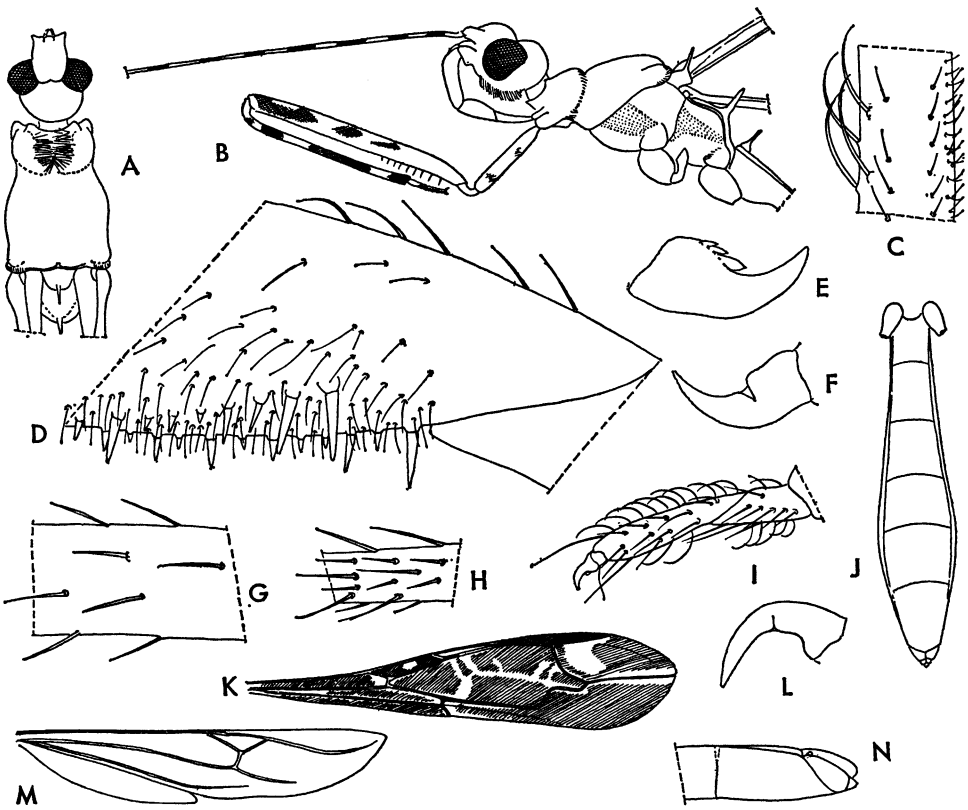


FIG. 107. *Ctydinna nitidicollis*, female. A. Anterior portion of body, dorsal view. B. Anterior portion of body, lateral aspect; color pattern shown on antennae and foreleg. C. Portion of fore tibia. D. Base of fore femur. E, F. Claws of foreleg. G. Portion of posterior femur. H. Portion of hind tibia. I. Fore tarsus. J. Abdomen, seen from below. K. Forewing, with color pattern. L. Claw of hind leg. M. Hind wing. N. Apical portion of abdomen, side view.

globular. Under surface of head with a large patch of erect silvery bristles. Eyes large. Interocular furrow situated about at level of center of eyes. Rostrum bent between first and second segments. First subcylindrical, extending beyond level of center of eyes; second two-thirds as long as first, slightly swollen; third slightly longer than second. Antenniferous tubercles large; antennae inserted near apex of head.

Pronotum completely covering mesonotum, highly polished, entirely glabrous, slightly constricted before middle. Fore half as long as hind lobe, transverse, its sides convex; lateral portions of disc elevated, central portion depressed, depression covered by long interlocking setae. Posterior lobe as long as maximum width, its sides convex, widest before middle. Disc uniformly convex, lacking elevations or depressions; lateral carinae of posterior lobe absent. Scutellum, mesonotum, and first abdominal tergite spined. Propleura and prosternum, mesopleura, mesosternum, and metapleura polished, glabrous, metapleura with dense pile as on under surface of head; acetabula with less conspicuous pile. Mesopleura and metapleura laterally with a broad, dull, horizontal stripe.

Forelegs slender. Coxa and trochanter simple. Femur with two series of processes, consisting of short spines inserted on wartlike processes; all much shorter than diameter of segment. Posteroventral series beginning at base of article, basal process slightly longer than any of others, remainder from medium-sized to very short. Anteroventral series beginning slightly apicad of posterocentral series, similar in structure to latter, not inter-

rupted at base. Apical processes of both series extremely small. Fore tibia five-sixths as long as femur, slender, ventrally with two series of decurved strong setae. Fore tarsus one-fifth as long as tibia, two-segmented, basal segment slightly more than half as long as second; segments hairy on all surfaces, setae not specialized. Claws subequal in size, inner one medially incised, outer one with three small processes on basal half of under surface. Mid and hind legs slender, posterior femur considerably surpassing apex of abdomen. Setae of mid and hind femora subequal in size, tibiae with microchaetae and macrochaetae. Tarsal segments subequal in size, with simple setae. Claws slender, curved, distinctly incised near middle below.

Surface of forewings rugose. Discal cell large, abruptly narrowed apically, narrowly pointed at base; M and Cu fused basad of cell; base of discal cell connected by short oblique vein to costal margin of wing, a similar but shorter vein connecting outer margin of cell to wing margin at level of basal fourth of cell. Distal portion of M simple. Pterostigma surpassing level of apex of cell, but remote from wing tip. Venation of hind wing complete; apical portions of Cu and R+M free, simple.

Abdomen moderately slender, widest beyond middle, not conspicuously constricted at base. Basal sternite convex below, its posterior margin very faintly emarginated. Surface of sternites with microchaetae and isolated macrochaetae.

Eighth and ninth tergites of female small, transverse, subhorizontal, not sculptured.

Male not known.

TYPE SPECIES: *Empicoris* (*Dictynna*) *nitidicollis* China (original designation).

DISTRIBUTION: Samoa.

ETYMOLOGY: An anagram of *Dictynna*, the original name of the genus.

OBSERVATIONS: The present taxon, here elevated to generic rank, is renamed following a suggestion of W. E. China. Its main differential characters are mentioned in the generic key. An examination of males may yield additional information.

Ctydinna nitidicollis (China)

Empicoris (*Dictynna*) *nitidicollis* CHINA, 1930, p. 148, figs. 25a–25d.

The main characters of the species are illustrated here. The specimen examined agrees perfectly with the original description, also based on a specimen taken on Upolu.

MATERIAL EXAMINED: Samoa: Afiamalu, Upolu, June 13, 1940, beating shrubbery, 2100 feet (E. C. Zimmerman; collection Usinger), one female.

DISTRIBUTION: Samoa.

TYPE: Female, British Museum (Natural History).

EMESOPSIS UHLER

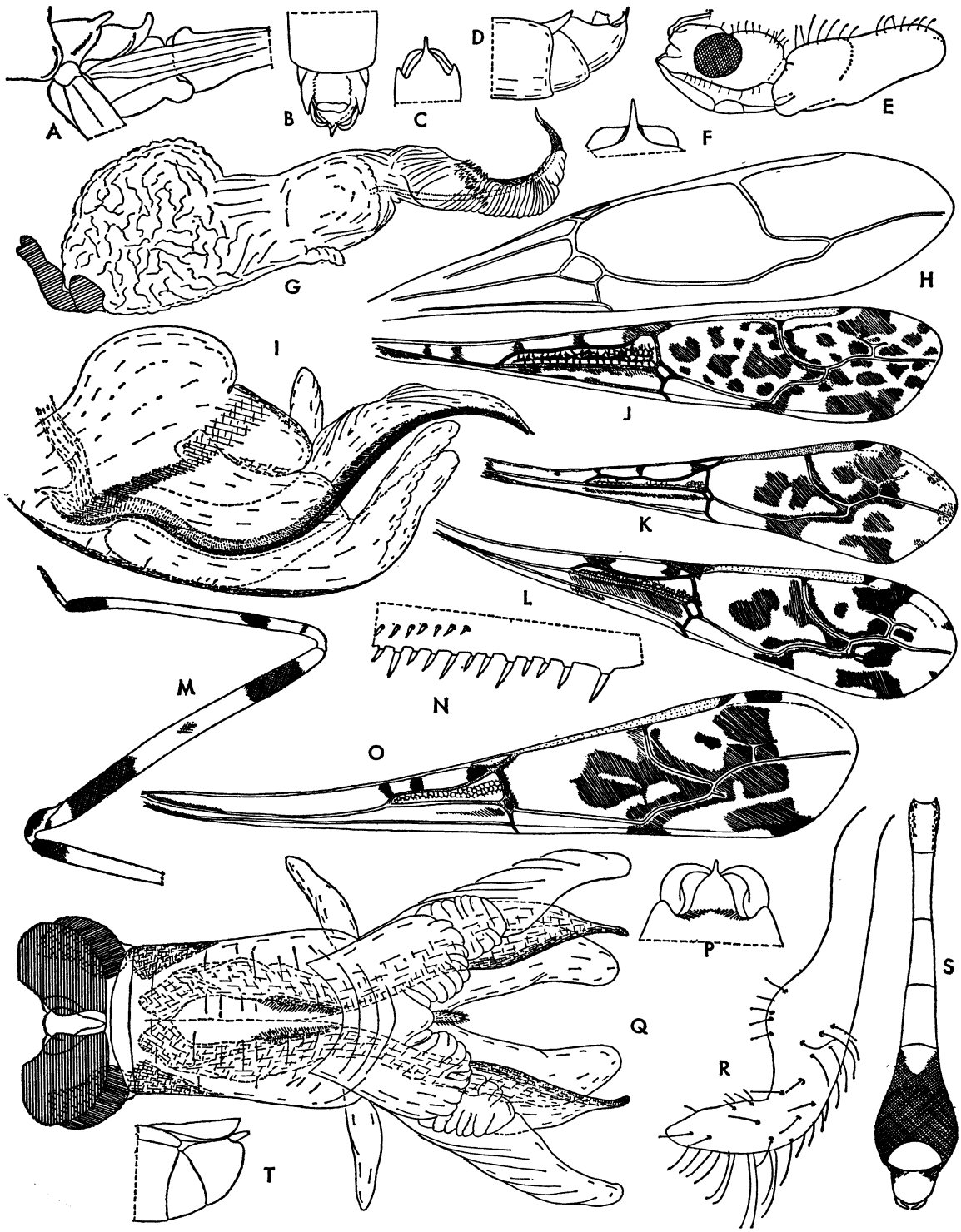
Emesopsis UHLER, 1893, p. 748.
Calphurnia DISTANT, 1909, p. 502.
Hadrocranella HORVÁTH, 1914a, p. 647.
Emesopsis (*Hadrocranella*): MCATEE AND MALLOCH, 1926, p. 119.

DESCRIPTION: Macropterous. Small species (4.5–11 mm.).

Body surface from dull to highly polished, with short and in some cases long hairs; head, thorax, and basal abdominal sternite with short, dense, adpressed, wool-like pile. General color from stramineous to dark brown, rarely without, generally with, more or less conspicuous color pattern on body and appendages, on forewings in shape of small or large spots, latter frequently ocellate, iridescent.

Head short, anteocular and postocular region of identical length, or postocular longer than anteocular, both moderately convex above. Anteocular with sides subparallel in dorsal view; postocular semiglobular in dorsal and lateral aspect. Eyes large. Interocular furrow from slightly to strongly backwardly curved, in some cases attaining, but in none surpassing, level of posterior border of eyes. Rostrum more or less conspicuously bent between first and second segments; first attaining level of posterior border of eyes, cylindrical to slightly widened toward apex; second half or slightly less than half as long as first, distinctly swollen; third slender, shorter than first. Antenniferous tubercles large; antennae inserted from about middle of anteocular portion to close to anterior border of head. First segment of antennae of male and female with or without long hairs.

Pronotum completely covering mesonotum, slightly constricted before middle. Lateral carina lacking. Fore lobe shorter than, or as long as, wide, its sides rounded or subparallel;


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T

disc posteriorly at center with a slight depression; either uniformly covered with wool-like pile, or with a more or less distinct, glossy, trident-shaped area on each side. Posterior lobe of varied proportions, moderately widened posteriorly, disc simple, rarely with a projection before center of hind border. Scutellum subtriangular, rounded apically, very rarely spined; metanotum spined; first abdominal tergite rarely simple, generally with a more or less well-developed process or spine.

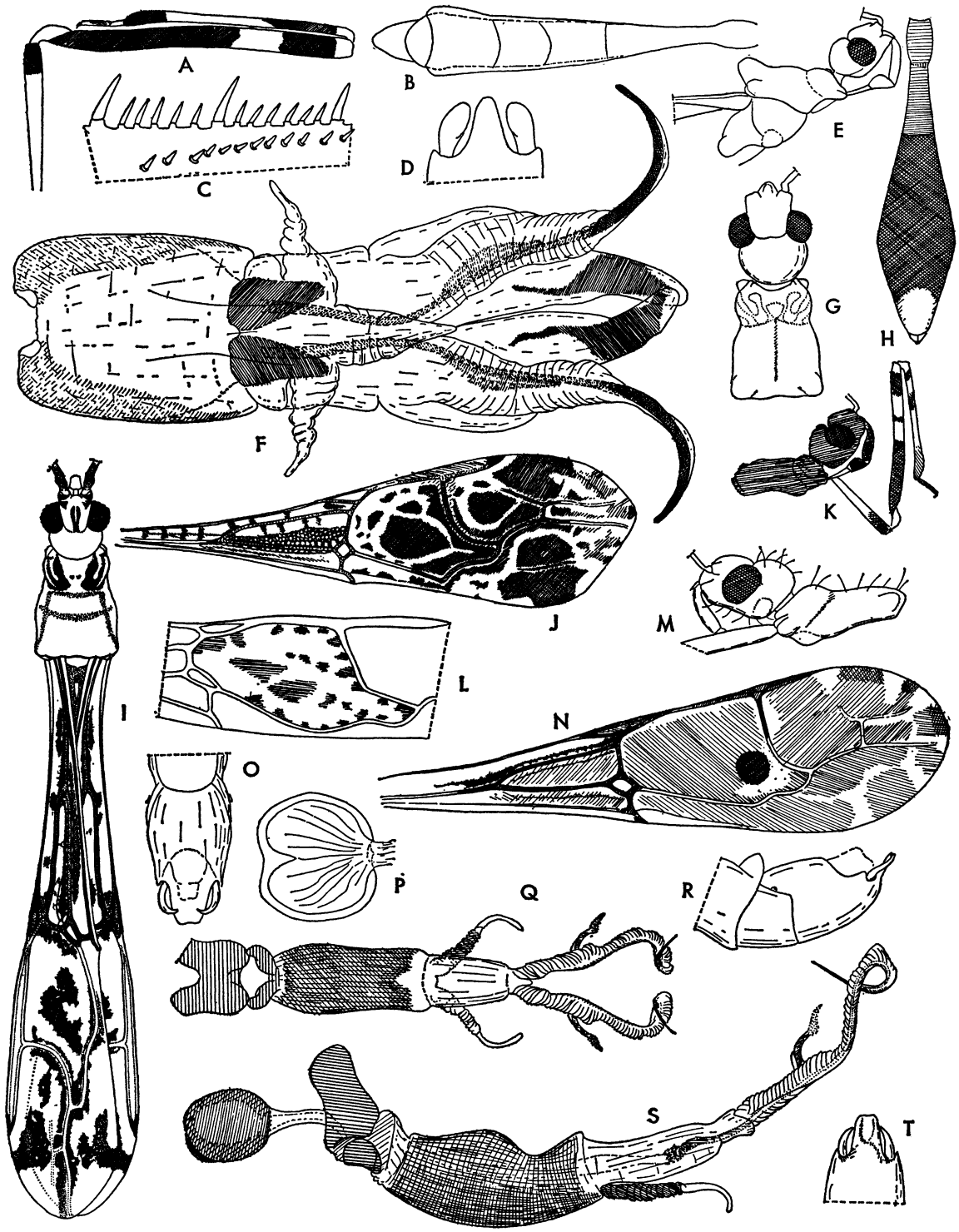
Forelegs slender to relatively stout. Coxa and trochanter simple. Femur with two series of processes. Posteroventral series beginning at or very near base of segment, composed of several larger and numerous smaller spines inserted on short, wartlike bases; basal process frequently larger than any of following, but invariably much shorter than diameter of segment. Anteroventral series beginning slightly distad of posteroventral series, not interrupted at base, similar in structure to latter series. Fore tibia slender, three-fourths to four-fifths as long as femur; ventrally with two series of strong, decurved setae. Fore tarsus one-fourth to one-fifth as long as tibia, generally two-segmented, rarely three-segmented, hairy on all surfaces, bristles simple. First segment much shorter than second (two-segmented tarsus) or segments subequal in size (three-segmented tarsus). Claws subequal in size, one with a medially incised ventral lamella, other with three to four very small, pointed, subbasal projections. Mid and hind legs slender, posterior femora surpassing apex of abdomen. Femora with short or long hairs; tibiae with microchaetae and macrochaetae. First and second tarsal segments subequal in length, third somewhat shorter, all with long hairs in moderate number, third in some cases ventrally at apex with a few apically widened setae. Claws slender, with a small, pointed process subbasally or near middle.

Surface of forewings smooth or partly to entirely areolate, frequently somewhat embossed on dark spots. Large discal cell strongly narrowed apically, truncate at base; basad of cell, M and Cu either free or forming an elongate subbasal cell; a small rectangular or quadrate basal cell situated at inner antesior angle of discal cell. A short stump of a vein in some cases emanating from inner angle of apex of discal cell. Apical branch of M beyond apex of discal cell attaining wing tip, in many cases with a bifurcate branch directed toward costal margin. Short vein connecting base of discal cell to costal margin. Pterostigma not projecting much beyond level of apex of discal cell, remote from wing tip. Hind wing with venation complete. R+M and Cu not connected beyond cross vein; R+M in some cases bifurcate subbasally.

Abdomen slender, widest on posterior third, gradually narrowed toward base, or very slender and strongly constricted just beyond base. Basal sternite conspicuously convex, its posterior margin straight or slightly emarginated. Surface of tergites and sternites with microchaetae and macrochaetae, lacking wool-like pile with exception of basal sternite.

Male: Seventh tergite rounded behind, projecting over part or all of genital segments. Eighth sternite fully visible, large. Pygophore small, not occupying more than one-seventh of total length of abdomen, varied in shape, sclerotized dorsally for most of its length. Posterosuperior process spinelike, triangular or scoop-shaped. Parameres of various shapes, with sparse to numerous long hairs. Articulatory apparatus very small, short; basal plates fused on their apical half, connected to phallobase by 1+1 small, inferolateral sclerites. Phallotheca from mem-

FIG. 108 (OPPOSITE PAGE). A–D. *Emesopsis aberrans*, male. A. Mesonotum, metanotum, and base of abdomen, dorsolateral view. B. Genital region, dorsal aspect. C. Pygophore, seen from behind. D. Genital region, side view. E, F. *Emesopsis aemula*, male. E. Head and prothorax, lateral view. F. Apex of pygophore, seen from behind. G. *Emesopsis aberrans*, phallus, lateral view. H. *Emesopsis aemula*, forewing. I, J. *Emesopsis amoenus*. I. Phallus, lateral view; articulatory apparatus not shown. J. Forewing, with color pattern. K. *Emesopsis bunda*, forewing, with color pattern. L. *Emesopsis decoris*, forewing, with color pattern. M–T. *Emesopsis bellulus*, male. M. Outlines of foreleg, with color pattern. N. Spines of base of fore femur. O. Forewing, with color pattern. P. Apex of pygophore, seen from behind. Q. Phallus, dorsal aspect. R. Paramere. S. Abdomen, ventral aspect, with color pattern. T. Genital region, lateral view.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T

branous to partly or totally sclerotized. Conjunctiva membranous, with or without paired projections. Vesica with or without one to several paired projections; if lacking projections, vesica arms in no case simply tubular in structure. Apical portions of vesica arms frequently sclerotized to a smaller or larger degree.

Female: Eighth and ninth tergite simple in structure, short, wider than long. Gonocoxites large. Syngonapophysis not sclerotized, forming a very small transverse band.

TYPE SPECIES: Of *Emesopsis*, *Emesopsis nubilus* Uhler (monobasic); of *Calphurnia*, *Emesopsis nubilus* Uhler (as *Calphurnia reticulata* Distant) (original designation); of *Hadrocranella*, *Hadrocranella imbellis* Horváth (monobasic).

DISTRIBUTION: Oriental and Australian regions (one species tropicopolitan).

OBSERVATIONS: McAtee and Malloch (1926) sank *Hadrocranella* to a subgenus of *Emesopsis*. Wygodzinsky and Usinger (1960) have shown in detail that even this distinction cannot be maintained. As demonstrated by the above generic description and the figures illustrating the genus here, it possesses an exceptionally wide range of color and morphological characters. However, even though the species of *Emesopsis* differ from one another in so many ways, they still show significant apomorphic features such as the presence of wool-like pile on the head, thorax, and basal abdominal sternite, the structure of the rostrum, the presence of a small, rectangular, basal cell laterad of the base of the distal cell, and the exceedingly complex endosoma. I agree with the opinion held by McAtee and Malloch (1926) when they wrote of *Emesopsis*: "The oriental fauna teaches us in this case, as in many others, that we must take a broad view of genera, or envisage the erection of an indefinite number of them." A rational subdivision of *Emesopsis* is not possible at the present time.

Wygodzinsky and Usinger (1960) expressed the opinion that the genus *Emesopsis* centers around the Philippine Islands and Malaya. Material that I have examined now indicates that another important speciation center is on New Guinea.

KEY TO THE SPECIES OF *Emesopsis*

1. Pattern of forewing consisting of large, frequently ocellate spots (figs. 108J–L, O; 109I, J; pl. 3, fig. 5); veins closing apex of discal cell mostly broadly bordered with dark (figs. 108L; 109J); bare areas on fore lobe of pronotum invariably very distinct (as shown in fig. 111A); portion of M extending beyond discal cell invariably with a bifurcate branch extending toward costal margin (figs. 108J–L, O; 109J; 110L). In rare cases pattern of forewings different but still conspicuous (fig. 109N), in these cases bare areas of fore lobe of pronotum, and bifurcate vein originating from apical portion of M, as above 2

   Pattern of forewings consisting of numerous small spots which are in no instance ocellate, or pattern hardly perceptible at all with incident illumination (figs. 109L; 111Q); bare areas of fore lobe of pronotum in most cases difficult to perceive, or absent; portion of M extending beyond discal cell not or very indistinctly branched (fig. 111Q) 13

2. Head and pronotum dorsally with conspicuous long hairs, the same also present on mid and hind femora; fore tarsi three-segmented (fig. 110C) . . . . . *neptunis*

   Long setae lacking on regions mentioned, or at least on femora; fore tarsi two-segmented (as shown in fig. 111I) 3

3. Center of hind border of pronotum with a very conspicuous, laterally compressed elevation (fig. 109E) . . . . . .*plagiatus*

FIG. 109 (OPPOSITE PAGE). A–D. *Emesopsis habros*, male. A. Outlines of foreleg, with color pattern. B. Abdomen, ventral view. C. Spines of base of fore femur. D. Apex of pygophore, seen from behind. E. *Emesopsis plagiatus*, head and thorax, lateral view. F. *Emesopsis habros*, phallus, dorsal view; articulatory apparatus not shown. G. *Emesopsis imbellis*, male, head and prothorax, dorsal view. H. *Emesopsis medusa*, female, abdomen, ventral view, with color pattern. I. *Emesopsis pallidicoxa*, general aspect, with color pattern. J, K. *Emesopsis medusa*, female. J. Forewing, with color pattern. K. Anterior portion of body, with color pattern. L. *Emesopsis nero*, portion of forewing; color pattern shown in discal cell. M, N. *Emesopsis imbellis*, male. M. Anterior portion of body, lateral view. N. Forewing, with color pattern. O–T. *Emesopsis nero*, male. O. Genital region, seen from above. P. Vesicula of phallus, in optical section. Q. Phallus, dorsal view. R. Genital region, lateral aspect. S. Phallus, side view; only one conjunctiva appendage and one vesica arm shown. T. Apex of pygophore, seen from behind. (I from Usinger, 1946.)

Center of hind border of pronotum without, or with a hardly perceptible, elevation . 4

4. Forewings with a conspicuous dark circular spot near apex of discal cell (fig. 109N) . . . . . *imbellis*

Pattern of forewings different 5

5. Head very strongly constricted ventrally at base in lateral view (fig. 110K), almost forming right angle with neck; forelegs testaceous, with indistinct brown annuli; pattern elements of forewings pale brown, with one dark piceous spot at base of apical discal cell and another at base of proximal discal cell (fig. 110L); abdomen short, not very narrow at base, its color uniformly testaceous . . . . . *scitulus*

Different combination of characters . . . 6

6. Fore coxae whitish, almost imperceptibly darkened subapically; wing pattern as shown in figure 109I . . . . . *pallidicoxa*

Fore coxae with a very conspicuous dark annulus apically; wing pattern different . .7

7. Spots of forewings clearly ocellate 8

Spots on forewings relatively large, scattered, not ocellate (fig. 108J) . . . . . *amoenus*

8. Under surface of head abruptly constricted in lateral view, forming a right angle with neck (fig. 109K); wing pattern as shown in figure 109J . . . . . *medusa*

Under surface of head not strongly constricted behind in lateral view, gradually merging with neck; wing pattern different . . . 9

9. A small spot or transverse, veinlike marking in costal area basad of proximal discal cell (fig. 108K); subapical dark annulus of posterior femur shorter than apical white portion 10

No spot or transverse marking in costal area basad of proximal discal cell; subapical annulus of hind femur at least as wide as apical white portion 11

10. Large spot on disc of apical cell connected to pigment band which accompanies apical vein of this cell; pigment on apex of wing very faint; apical discal cell twice as long as wide; reticulate fascia of basal discal cell extended along whole length of cell (fig. 108K) . . . . . *bunda*

Large spot or disc of apical discal cell not connected to pigment band which accompanies apical vein of this cell; pigment on apical portion of forewing not noticeably fainter than on rest of wing; discal cell less than twice as long as wide; reticulate fascia of basal discal cell not extending along whole length of cell . . . . . *obsoletus*

11. Abdomen regularly widened posteriorly in male (fig. 109B); posterior process of pygophore tongue-shaped, rounded apically (fig. 109D); dark portions of fore femur more extensive than pale areas (fig. 109A); larger spines of posteroventral series of fore femur about twice as long as short ones (fig. 109C) . . . . . *habros*

Abdomen conspicuously and abruptly widened on posterior third in male (fig. 108S); posterior process of pygophore pointed apically (fig. 108P); dark portions of fore femur not more extensive than pale areas (fig. 108M); larger spines of fore femur much less than twice length of short ones (fig. 108N) 12

12. Short free vein at apex of apical discal cell well developed (fig. 108O); pygophore darkened only laterally at base (fig. 108S); mid and hind femora with submedian annuli virtually imperceptible . . . *bellulus*

Short free vein at apex of apical discal cell almost imperceptible (fig. 108L); pygophore dark, with exception of extreme apex only; mid and hind femora with two distinct submedian annuli . . . . . *decoris*

13. Species rather uniformly brownish, markings of body and appendages hard to make out with incident light; hind lobe of pronotum about twice as long as fore lobe (fig. 111A, B); mid and hind legs with conspicuous long hairs (fig. 111K) . . . . . *nubilus*

Species conspicuously marked; mid and hind legs lacking long hairs; hind lobe of pronotum less than twice as long as fore lobe 14

14. Head, antennae, and thorax with some long hairs in addition to short pile (fig. 108E) . . . . . *aemula*

Head, antennae, and legs with short pile only 15

15. Bare areas of fore lobe of pronotum quite distinct; apical process of pygophore of male spinelike (fig. 108C); parameres strongly bent on apical third 16

Bare areas of fore lobe of pronotum not perceptible; process of pygophore more or less scooplike (fig. 109T); parameres little if any bent on apical portion 17

16. Apex of process of pygophore surpassing apices of parameres (fig. 108B, C); conjunctiva appendages very short (fig. 108G) . . . . . *aberrans*

Apex of process of pygophore not surpassing apices of parameres; conjunctiva appendages long and slender, tubular on distal portion . . . . . *spicatus*

17. Discal cell of forewing at bend of vein closing its apex with a subquadrate spot notably larger than its fellows; dorsal projections of

vesica very stout and heavily pigmented 18
Discal cell of forewing at bend of vein closing its apex with spots subequal in size (fig. 109L); dorsal projections of vesica slender, not heavily pigmented (fig. 109Q, S) . .19
18. Apical portion of vesica lacking projections . . . . . *gaius*
Apical portion of vesica with several short projections . . . . . *gallienus*
19. Process of pygophore truncate apically (fig. 109T); conjunctiva appendages long and slender (fig. 109Q, S) . . . . . *nero*
Process of pygophore rounded apically; conjunctiva appendages much shorter . *hadrian*

Emesopsis aberrans (Distant), new combination

Figure 108A–D, G

Calphurnia (?)*aberrans* DISTANT, 1909, p. 503.
Calphurnioides aberrans: DISTANT, 1913, p. 164.

The specimen examined is from the type locality. It agrees perfectly with the descriptions available as well as with Distant's (1910) illustration. Its genital region and phallus are illustrated here. *Emesopsis aberrans* is very similar to *E. spicatus* and seems to differ only by minor characters in the genitalia, as indicated in the key. The presence of a spine to the scutellum (fig. 108A) is remarkable.

MATERIAL EXAMINED: Ceylon: Peradeniya, March 3, 1902 (Uzel; the American Museum of Natural History), one male.

DISTRIBUTION: Ceylon.

TYPE: One specimen (lacking abdomen), British Museum (Natural History).

Emesopsis aemula (Horváth), new combination

Figure 108E, F, N

Calphurnioides aemula HORVÁTH, 1914a, p. 650.

The type has been examined. Some of its characters are illustrated here. The pronotum is completely covered with adpressed, wool-like pubescence; the bare areas of the fore lobe are difficult to make out. There is no short stump of vein at the apex of the distal cell, nor does the apical portion of M possess any branch. The spots in the apical discal cell and the distal portion of the forewing are rather faint, slightly iridescent, and somewhat ocellate.

DISTRIBUTION: New Guinea.

TYPE: Male, Hungarian National Museum.

Emesopsis amoenus Wygodzinsky and Usinger

Figure 108I, J

Emesopsis amoenus WYGODZINSKY AND USINGER, 1960, p. 252, figs. 9a–9j.

The figures used in the present paper were taken from the original description, as were those of many of the following species.

DISTRIBUTION: Caroline Islands.

TYPE: Male, Kyushu University.

Emesopsis bellulus Wygodzinsky and Usinger

Figure 108M–T

Emesopsis bellulus WYGODZINSKY AND USINGER, 1960, p. 256, figs. 12a–12 l, 13a–13c.

DISTRIBUTION: Caroline Islands.

TYPE: Male, United States National Museum.

Emesopsis bunda Wygodzinsky

Figure 108K

Emesopsis bunda WYGODZINSKY, 1956, p. 209, figs. 109–116.

DISTRIBUTION: Australia (Queensland).

TYPE: Male, Bernice P. Bishop Museum.

Emesopsis decoris Wygodzinsky and Usinger

Figure 108L

Emesopsis decoris WYGODZINSKY AND USINGER, 1960, p. 258, figs. 14a–14c.

DISTRIBUTION: Caroline Islands.

TYPE: Male, Kyushu University.

Emesopsis gaius McAtee and Malloch

Emesopsis (*Emesopsis*) *gaius* MCATEE AND MALLOCH, 1926, p. 123, figs. 3, 6, 19.

The typical series has been examined. The specimens agree well with the original description and figures.

DISTRIBUTION: Singapore.

TYPE: Male, United States National Museum.

Emesopsis gallienus McAtee and Malloch

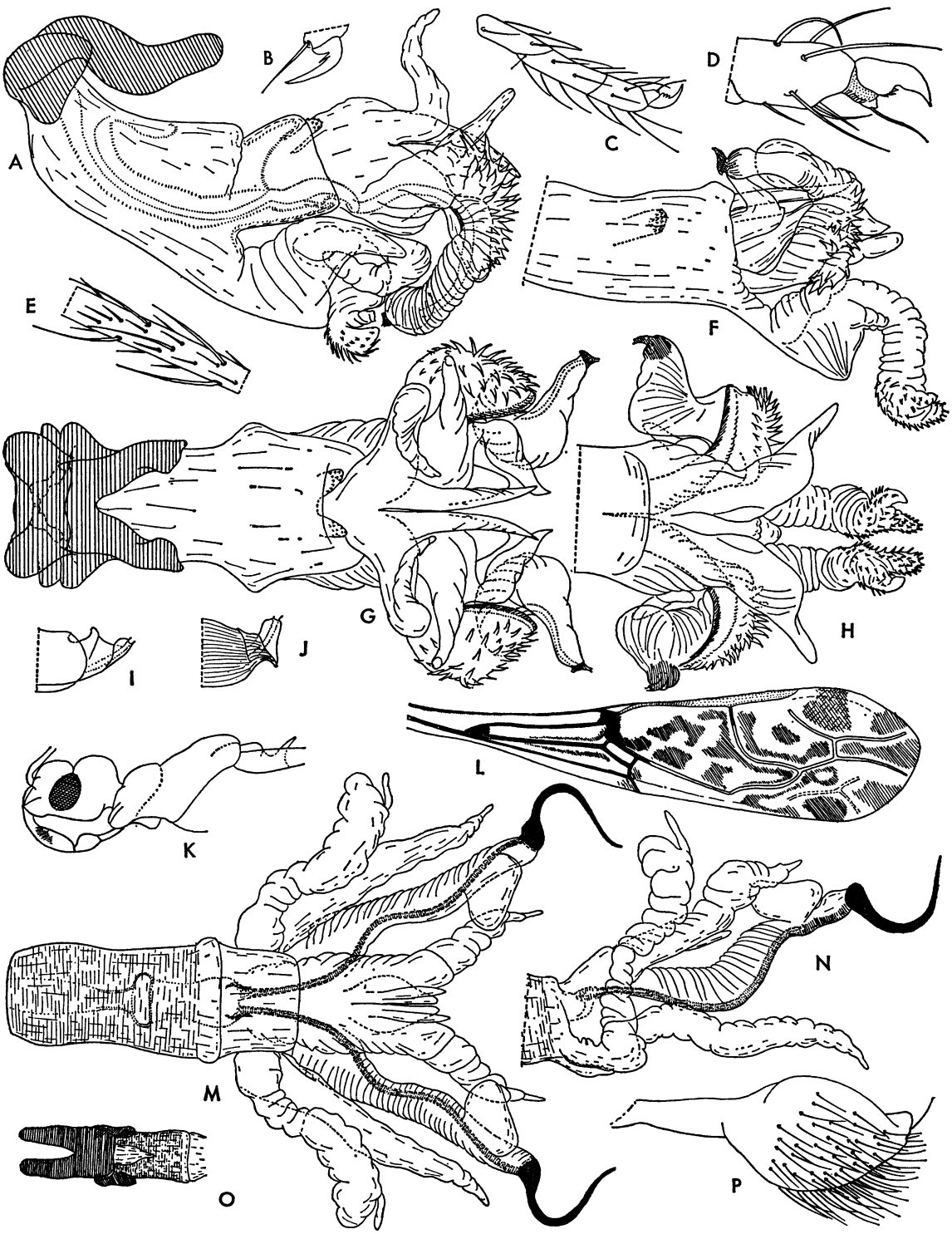
Emesopsis (*Emesopsis*) *gallienus* MCATEE AND MALLOCH, 1926, p. 123, fig. 20.

DISTRIBUTION: Philippines.

TYPE: Male, United States National Museum.

Emesopsis habros Wygodzinsky and Usinger

Figure 109A–D, F


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P

Emesopsis habros WYGODZINSKY AND USINGER, 1960, p. 254, figs. 10a–10j, 11a–11c.

DISTRIBUTION: Caroline Islands.
TYPE: Male, Bernice P. Bishop Museum.

Emesopsis hadrian McAtee and Malloch

Emesopsis (Emesopsis) hadrian MCATEE AND MALLOCH, 1926, p. 124, fig. 22.

DISTRIBUTION: Philippines.
TYPE: Male, United States National Museum.

Emesopsis imbellis (Horváth), new combination

Figure 109G, M, N

Hadrocranella imbellis HORVÁTH, 1914a, p. 648, fig. 8.

This is the type species of *Hadrocranella* Horváth. The typical specimen, a male, has been examined, and is partly illustrated here. The legs are uniformly testaceous, though the fore femora are somewhat darkened toward the apex. The color pattern of the forewings (fig. 109N) is unique; they are delicately areolate on the whole surface. There are a few scattered long hairs on the head and thorax (fig. 109M); the mid and hind legs bear short bristles only. The spines of the fore femora are distinct, though short. The posterior process of the pygophore is in the shape of a long slender spine in lateral and posterior views.

DISTRIBUTION: New Guinea.
TYPE: Male, Hungarian National Museum.

Emesopsis medusa (Kirkaldy), new combination

Figure 109H, J, K

Ploiariodes medusa KIRKALDY, 1908b, p. 373, pl. 4, fig. 12.
Hadrocranella medusa: MCATEE AND MALLOCH, 1923, p. 163.

One of Kirkaldy's specimens is partly illustrated here. The dark portions of the forewing are somewhat embossed and distinctly rugose (not shown in drawing). The distinctive color pattern of the under surface of the abdomen is represented schematically in figure 109H.

DISTRIBUTION: Fiji.
TYPE: Female, Bernice P. Bishop Museum.

Emesopsis neptunis McAtee and Malloch

Figures 13K; 110A–J

Emesopsis (Hadrocranella) neptunis MCATEE AND MALLOCH, 1925, p. 373, figs. 1, 10, 17.

In this species, as well as in an undescribed one from Thailand, the tarsi of the forelegs are three-segmented (fig. 110C). The remaining characters of the species are as usual in the genus. The phallus of the male is illustrated here in detail (fig. 110A, F–J); its structure is exceedingly complex, though completely identical in specimens from the Philippines and those from Larat. The latter differ only by the chaetotaxy of the mid and hind femora; in specimens from Mt. Makiling, uniform long hairs are present over the whole length of the femora, whereas in those from Larat these hairs become conspicuously shorter on the apical third of the segment.

MATERIAL EXAMINED: *Philippines:* Mt. Makiling, Luzon (Baker; United States National Museum), one male. *Moluccas:* Larat (P. Muir; the California Academy of Sciences), eight males, two females; (P. Muir; the American Museum of Natural History), two males, one female. *Thailand:* Banna, Chawang near Nabon, September 6, 1958, palm, 125 meters (J. L. Gressitt; Bernice P. Bishop Museum), one female.

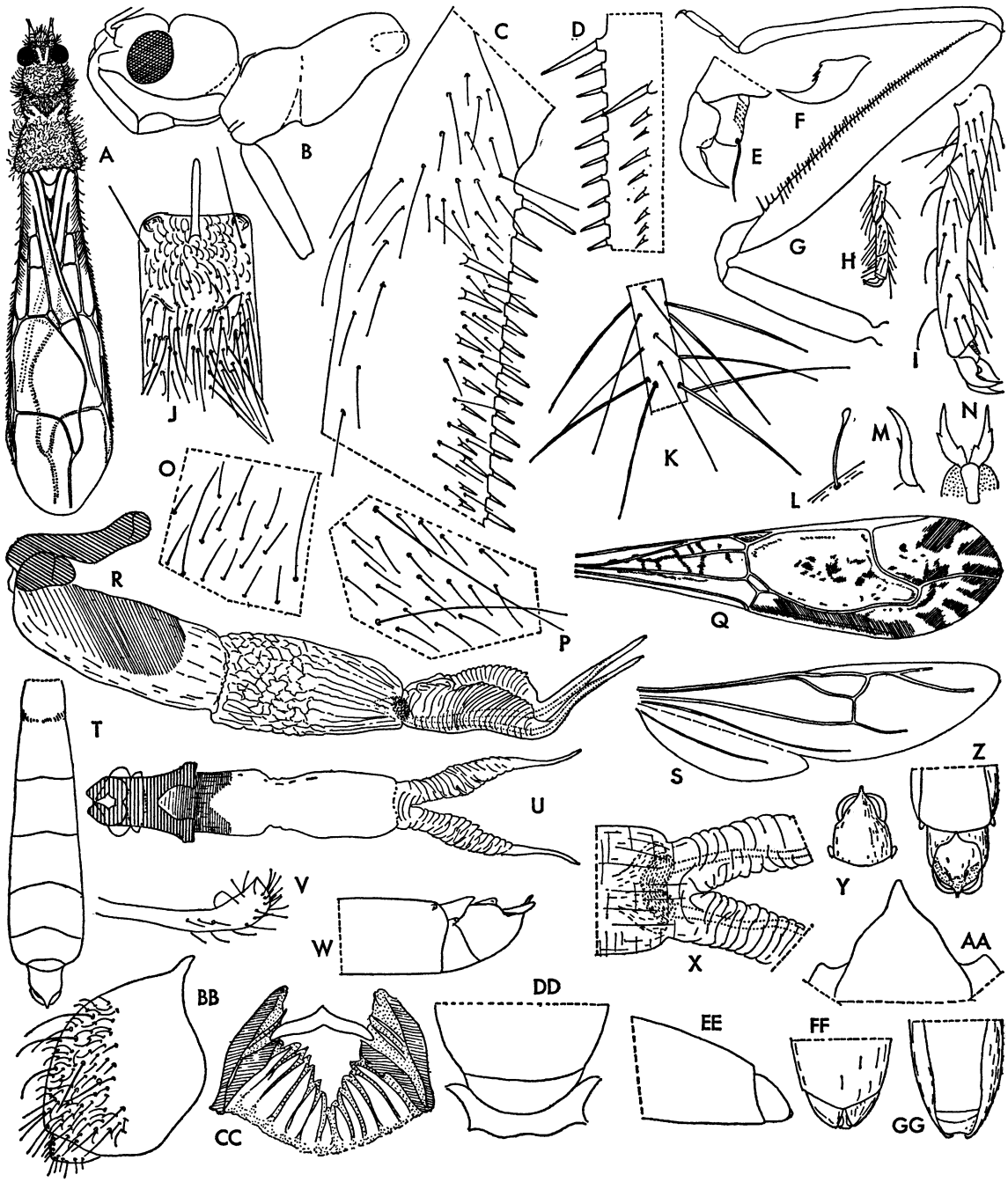
DISTRIBUTION: Philippines; Moluccas; Thailand.
TYPE: Male, United States National Museum.

Emesopsis nero McAtee and Malloch

Figure 109L, O–T

Emesopsis (Emesopsis) nero MCATEE AND MALLOCH, 1926, p. 123, figs. 5, 15, 21.

FIG. 110 (OPPOSITE PAGE). A–J. *Emesopsis neptunis*, male. A. Phallus, lateral view, with endosoma completely everted. B. Claw of hind leg. C. Fore tarsus. D. Apical segment of fore tarsus with outer claw. E. Portion of posterior tibia. F. Apex of phallotheca, with endosoma only partly everted. G. Phallus, dorsal view, with endosoma completely everted. H. Apex of phallotheca, with endosoma only partly everted, dorsal view. I, J. Apex of main vesica arm, with secondary gonopore, two different views. K–P. *Emesopsis scitulus*, male. K. Anterior portion of body, lateral view. L. Forewing, with color pattern. M. Phallus, ventral view. N. Right side portion of endosoma, lateral view. O. Base of phallotheca with articulatory apparatus, dorsal aspect. P. Paramere.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF
GG

The male genitalia are illustrated here in detail.

MATERIAL EXAMINED: Philippines: Mt. Makiling, Luzon (Baker; United States National Museum), one male.

DISTRIBUTION: Philippines.

TYPE: Male, United States National Museum.

Emesopsis nubilus Uhler

Figures 5J; 111A–Z, AA–GG

Emesopsis nubilus UHLER, 1893, p. 718.
Calphurnia reticulata DISTANT, 1909, p. 503.
Calphurnia pacalis HORVÁTH, 1914a, p. 649, fig. 9.
Emesopsis pacalis: MCATEE AND MALLOCH, 1923, p. 163.
Ploiariola pallida JEANNEL, 1919, p. 151, fig. 6; pl. 5, fig. 5.
Calphurnia pallida: VILLIERS, 1948, p. 432, figs. 823–828.
Emesopsis pilosus USINGER, 1946, p. 42, fig. 7.

The above synonymy was established by Wygodzinsky and Usinger (1960), even though they had not seen all types. The type specimen of *pacalis* has since been examined; it agrees perfectly with *nubilus*.

As *Emesopsis nubilus*, the type of the genus, had not been well analyzed, it its here illustrated in detail. The wing pattern (fig. 111Q) is shown as observed by transmitted light; in incident light, it is not easy to make out.

This species is one of the most widely distributed of the subfamily; hence its ample synonymy. The frequency with which the species is intercepted by plant quarantine inspectors shows its capacity for passive dispersal and explains its wide geographical range.

MATERIAL EXAMINED: *United States:* Florida: Miami, September 18, 1944 (W. W. Wirth; United States National Museum), one female. *Dominican Republic:* Sanchez, June 7–12, 1915 (the American Museum of Natural History), one female. *Brazil:* Pará: Fordlandia, June, 1931 (R. C. Shannon; United States National Museum), one female; Bahia: Pirajá, August 22, 1930 (Davis and Shannon; United States National Museum), one male. *Hawaii:* Honolulu, December 20, 1930, in dry banana-leaf packing (United States National Museum), one male; Oahu: Ewa, *ex* light trap (J. Beardsley; Bernice P. Bishop Museum), one female. *Java:* Batavia, 1907–1908 (E. Jacobson; Zoölogisch Museum), one male. *Philippines:* Los Baños (Baker; United States National Museum), one male, one female. *China: Ex* "taro" (the California Academy of Sciences), one male. *India:* South India: Coimbatore (P. Susai Nathan; the American Museum of Natural History), one male. *Mauritius:* Rose Hill, March, 1951 [Ray Mamet; British Museum (Natural History)], three males. *Sierra Leone:* Njala, June 17, 1925, October, 1926, at light [E. Hargreaves; British Museum (Natural History)], one male, one female. Intercepted: *Hawaii* (United States National Museum), two females; Honolulu (F. H. B.; United States National Museum), four females, five females, two nymphs; (F. H. B.; the American Museum of Natural History), one male, one female, one nymph; *Guam:* October 9, 1938 (United States National Museum), one male; *Siam:* intercepted at San Francisco, November 16, 1937 (United States National Museum), one female; *Philippines:* intercepted at Honolulu, July 29, 1938, on *Dendrobium* (United States National Museum), one male; *Mexico:* San Luis Potosí: Tamazunchales, August 15, 1947, on orchids intercepted at Laredo, Texas (United States National Museum), one male.

FIG. 111 (OPPOSITE PAGE). *Emesopsis nubilus.* A. General aspect. B. Anterior portion of body, lateral view. C. Base of fore femur. D. Spines of base of fore femur, different specimen. E. Praetarsus and inner claw of foreleg. F. Outer claw of foreleg. G. Foreleg. H. Posterior tarsus. I. Fore tarsus. J. Basal abdominal tergite, with chaetotaxy. K. Portion of hind femur. L. Capitate seta of under surface of apical segment of hind tarsus. M, N. Claws of hind leg, different views. O. Setae of abdominal tergite. P. Setae of abdominal sternite. Q. Forewing; color pattern intensified in drawing. R. Phallus, lateral view. S. Hind wing. T. Abdomen of male, ventral view. U. Phallus, dorsal aspect. V. Paramere. W. Apex of abdomen of male, lateral aspect. X. Base of vesica arms, high magnification. Y. Pygophore, seen from behind. Z. Apex of abdomen of male, dorsal view. AA. Apex of pygophore, high magnification. BB. Gonocoxite and gonapophysis. CC. Posterior gonapophysis with syngonapophysis. DD. Last tergites of female, as seen on slide mount; setae not shown. EE. Apex of abdomen of female, lateral view. FF. Genital region of female, ventral aspect. GG. Apex of abdomen of female, dorsal view. (A from Usinger, 1946.)

TYPES: Of *Emesopsis nubilus*, male, British Museum (Natural History); of *Calphurnia reticulata*, female, British Museum (Natural History); of *Calphurnia pacalis*, male and female (no holotype designated), Hungarian National Museum; of *Ploiariola pallida*, one specimen, Muséum National d'Histoire Naturelle; of *Emesopsis pilosus*, female, Bernice P. Bishop Museum.

Emesopsis obsoletus McAtee and Malloch

Emesopsis (Hadrocranella) obsoletus MCATEE AND MALLOCH, 1926, p. 121, figs. 2, 11.

DISTRIBUTION: Singapore.

TYPE: Male, United States National Museum.

Emesopsis pallidicoxa (Usinger)

Figure 109I

Hadrocranella pallidicoxa USINGER, 1946, p. 41, fig. 6.

Emesopsis pallidicoxa: WYGODZINSKY AND USINGER, 1960, p. 252, figs. 8a–8c.

The general aspect of this insect is illustrated here.

DISTRIBUTION: Mariana Islands.

TYPE: Male, Bernice P. Bishop Museum.

Emesopsis plagiatus Miller

Plate 3, figure 5; text figure 109E

Emesopsis plagiatus MILLER, 1941, p. 777, figs. 3a, 3b.

The high, laterally compressed elevation of the hind border of the pronotum of this species (fig. 109E) is unique in the genus.

MATERIAL EXAMINED: Philippines: Zamboanga, Mindanao (Baker; the American Museum of Natural History), one male; (Baker; United States National Museum), one female.

DISTRIBUTION: Malaya; Philippines.

TYPE: Female, British Museum (Natural History).

Emesopsis scitulus Wygodzinsky and Usinger

Figure 110K–P

Emesopsis scitulus WYGODZINSKY AND USINGER, 1960, p. 248, figs. 6a–6g, 7a–7f.

This species has one of the most complex phalli observed in the genus (fig. 110M, N).

DISTRIBUTION: Caroline Islands.

TYPE: Male, United States National Museum.

Emesopsis spicatus McAtee and Malloch

Emosopsis (Emesopsis) spicatus MCATEE AND MALLOCH, 1926, p. 122, figs. 12–14, 18.

DISTRIBUTION: Philippines.

TYPE: Male, United States National Museum.

EMPICORIS WOLFF

Empicoris WOLFF, 1811, p. 5.
Ploiariodes WHITE, 1881, p. 58.
Ploiariola REUTER, 1888, p. 711.
Corempis DISPONS, *in* Dispons and Stichel, 1959, pp. 83, 85 (new synonymy).
Empicorella DISPONS, *in* Dispons and Stichel, 1959, pp. 83, 97 (new synonymy).
Ploeariodes AUCT.
Ploeariola AUCT.

DESCRIPTION: Macropterous. Small species (3–7 mm.).

Body surface from dull to moderately shining, with short and, in some cases also long, hairs, especially on antennae and legs; short, adpressed, wool-like pubescence frequently present on head and thorax, forming patches, lines, and stripes. General color whitish to stramineous; head and body variously darkened, forewings checkered with numerous dark areas and spots intersected by white lines, antennae and legs with from few to mostly very numerous dark annuli.

Head short, anteocular and postocular regions subequal in length, or postocular longer than anteocular; both moderately convex above. Anteocular with sides subparallel in dorsal view, postocular semiglobular in dorsal, rounded or subtruncate behind in lateral aspect. Eyes from small to large. Interocular furrow situated behind level of center of eyes, from almost attaining to slightly surpassing level of posterior margin of eyes. Rostrum bent between first and second segments; first subcylindrical, at least reaching level of center of eyes; second slightly swollen only, more than half as long as first; third as long as second. Antenniferous tubercles large; antennae inserted near apex of head, with or without long hairs in one or both sexes.

Pronotum completely covering mesonotum, subrectangular, generally slightly widened posteriorly; a faint constriction before

middle. Fore lobe with sides rounded, in most cases much wider than long, very rarely as long as, or longer than, wide; depressed in middle; when covered with conspicuous pile, a distinct, simple, central area and 1+1 lateral, trident-shaped areas bare. Posterior lobe as long as wide, or slightly longer or shorter than wide; disc flattened, somewhat depressed longitudinally along middle; lateral carinae generally well developed, very conspicuous, but in some cases only faintly perceptible, or only anterior portion developed; disc in some cases with 1+1 submedian carinae similar in structure to lateral ones; posteriorly in middle before hind margin frequently with a projection. Scutellum short, semicircular, with or, rarely, without spine; metanotum with or, rarely, without spine; first abdominal tergite spined or, rarely, without spine; invariably at least one of spines mentioned present.

Forelegs relatively short, from very slender to stout. Coxae simple, only in one case with spines at its base. Trochanter simple. Femur with two series of processes, consisting of short to moderately elongate, spinelike setae inserted on short bases; these processes generally extremely short and difficult to observe with low power, rarely more elongate, but in no case surpassing length of diameter of femur. Posteroventral series beginning at base of article, processes subequal or of distinctly different sizes, basal process frequently longest, but in some cases longest process situated at some distance from base of series. Anteroventral series not interrupted at base, beginning near level of posteroventral series, similar in structure to latter. Fore tibia four-fifths to five-sixths as long as femur, ventrally with two series of similar or dissimilar strong setae which may become spinelike. Fore tarsus one-fourth to one-fifth as long as tibia, two-segmented, basal segment half as long as apical; hairy on all surfaces, setae of under side more or less spinelike. Claws subequal in size, outer one with a medially incised ventral lamella, inner one with two to three small, pointed, subbasal projections. Mid and hind legs slender, femora distinctly thickened at base and again at apex; hind femora slightly surpassing apex of forewings. Setae of femora and tibiae uniform or distinctly of two sizes. Tarsal segments subequal in size, setae simple, occasionally some on ventral surface of third segment widened apically. Claws slender, distinctly incised near middle.

Surface of forewing smooth or delicately rugose, dark regions frequently somewhat embossed. Discal cell pointed at apex, narrowly truncate at base; base of discal cell connected by a short oblique vein to costal margin of wing; a similar but shorter vein connecting outer margin of cell to wing border at level of basal fourth of cell. M and Cu fused basad of discal cell. Apical portion of M simple. Pterostigma attaining and generally surpassing level of apex of cell, remote from wing tip. Hind wing with venation complete; m-cu cross vein and section of M connecting m-cu to R+M in some cases forming a continuous straight line. Cu and R+M not connected beyond cross vein, simple.

Abdomen from slender and almost parallel-sided to oval, widest at or behind middle, in no case conspicuously constricted at base. Basal sternite convex below, its posterior margin straight or slightly emarginated. Surface of sternites and tergites with dense microchaetae and isolated macrochaetae, latter frequently inserted in small, bare spots.

Male: Seventh tergite salient behind, rounded or truncate apically, projecting over genital segments. Eighth sternite very large, subtriangular in lateral view, covering a large portion of pygophore, its posterior portion subhorizontal. Pygophore small, not more than one-seventh of total length of abdomen, varied in shape, sclerotized dorsally for most of its extension. Posterior process spinelike, triangular, subrectangular or emarginated apically. Parameres generally simple, rod-shaped, curved apically, rarely with a small submedian projection or a deep apical emargination; hairs simple, not very numerous. Articulatory apparatus short, wide in lateral view. Basal plate struts well developed, fused on basal half and widely divergent on apical half. Phallotheca membranous; basal portion entirely membranous, or slightly sclerotized on dorsal or ventral surface, or both, and in most cases with 1+1 conspicuous, lateral, subtriangular, sclerotized areas; apical portion sclerotized ventrally, this sclerotized region covering varied extension of lateral, rarely meeting on dorsal, surface of phallo-

theca; phallotheca processes rarely developed, membranous. Conjunctiva subcylindrical, membranous, with or without paired membranous processes. Vesica arms varying in length, from shorter than phallotheca to longer than whole abdomen, lacking processes, wide basally, gradually or abruptly narrowed toward apex, slightly pigmented or not.

Female: Eighth and ninth tergites transverse to subsemicircular; eighth horizontal, ninth subvertical, frequently carinate longitudinally along middle. Gonocoxites large; gonapophyses well developed, with numerous setae. Syngonapophysis transverse, slightly rounded behind, with a trisinuate, transverse sclerotization.

TYPE SPECIES: Of *Empicoris*, *Gerris vagabundus* Linné (monobasic); of *Ploiariodes*, *Ploiariodes whitei* Blackburn (monobasic); of *Ploiariola*, *Cimex vagabundus* Linné; of *Corempis*, *Ploiaria xambeui* Montandon (monobasic); of *Empicorella*, *Empicoris rubromaculatus* Blackburn (as *Empicoris tingitanus* Dispons) (monobasic).

DISTRIBUTION: All zoogeographical regions.

OBSERVATIONS: Although Scopoli (1786–1788) included only a single species, *domestica*, in his genus *Ploiaria*, Latreille (1802) mentioned *Gerris vagabunda* as an example of *Ploiaria*. The same author (Latreille, 1804) wrote about *Ploiaria* that "Scopoli . . . a proposé cette nouvelle coupe générique, qui a pour type la punaise vagabonde de Linnaeus; la punaise culiciforme de Geoffroy et de De Geer." All subsequent authors have followed Latreille and accepted the name *Ploiaria* for the species of the present genus, until Reuter (1888) called attention to the fact that *Ploiaria* Latreille is not identical with *Ploiaria* Scopoli, proposing the new name *Ploiariola* for *Ploiaria* Latreille. McAtee and Malloch (1923) called attention to the availability of *Empicoris* Wolff, 1811, for the genus under consideration.

Ploiariodes White (1881) is based on the Hawaiian *whitei* Blackburn. As shown below, this species differs in several respects from all other species of the genus, but these differences are not of generic level. Though Bergroth (1909) insisted on the distinctiveness of the two genera, he wrote later (Bergroth, 1923), in a reference apparently overlooked by most subsequent workers, that "*Ploiariola* Reuter has now proved to be generically inseparable from *Ploeariodes* B. White." The same opinion was adopted by McAtee and Malloch (1925), but Dispons and Stichel (1959) and Dispons (1960a) again advocated the generic separation of *Empicoris* and *Ploiariodes*, based upon Bergroth's paper published in 1909, not furnishing new evidence.

Corempis Dispons has as the type *Ploiaria xambeui* Montandon, being distinguished from *Empicoris*, according to Dispons and Stichel (1959), by the absence of spines on the under side of the fore femur. A re-examination of a specimen of *xambeui* in the course of the present work has shown that these spines are present, though small, and, as no other characters could be found to distinguish *xambeui* generically from the species of *Empicoris*, *Corempis* is here rejected.

The type and only included species of *Empicorella* Dispons is *Empicoris tingitanus*, shown below to be identical with *rubromaculatus* (Blackburn), a species not differing significantly from the type of *Empicoris*. Dispons (1960a), who maintained *Empicoris* and *Ploiariodes* as distinct genera, compared both with his *Empicorella*. The abbreviated lateral carinae of the pronotum, as is typical for *rubromaculatus*, is also found in an undescribed, otherwise quite typical *Empicoris*, and in any case is hardly of generic value; the same applies to the emarginate process of the male pygophore. *Empicorella* was said by Dispons to differ from *Ploiariodes* by such indubitably specific characters as the shape of the postocular portion of the head and slightly different proportions of the pronotum and fore femur, which certainly do not warrant generic status. The apparently more significant difference in the number of the segments of the fore tarsus is non-existent, as *whitei* possesses two-segmented fore tarsi as do the other species of *Empicoris* and not three-segmented ones as described erroneously by White. It is concluded that *Empicorella* cannot be maintained.

KEY TO THE NEW WORLD SPECIES OF *Empicoris* (ADAPTED FROM MCATEE AND MALLOCH, 1925)

1. Lateral carinae of hind lobe of pronotum distinguishable at anterior extremities only (fig. 112T); pattern of forewings as shown in figure 112W, apex of pterostigma gen-

erally reddish; pygophore deeply emarginated apically (fig. 112Z) . *rubromaculatus*

Lateral carinae of hind lobe of pronotum complete (figs. 112 O; 113B; 114A; 115B); pattern of forewing different, pterostigma only rarely reddish at apex; posterior border of process of pygophore different (figs. 112H, N, CC; 113J; 114J, AA; 115 O) 2

2. Humeral angles each with a conspicuous flap-like projection (fig. 113A); hind lobe of pronotum coarsely and densely punctate (fig. 113A, B) . . . . . *incredibilis*

Humeral angles lacking distinct projections; hind lobe of pronotum not punctate . . 3

3. Posterior lobe of pronotum with 1+1 linear, submedian, whitish carinae similar in structure to lateral carinae; scutellum and metanotum lacking spines (fig. 114A; pl. 1) . 4

Posterior lobe of pronotum lacking sharply defined, submedian carinae; scutellum and metanotum spined (figs. 112 O; 115A; pl. 2, fig. 8) 5

4. Fore femur with several conspicuous large spines before middle (fig. 114B); hind lobe of pronotum tuberculate at middle before posterior margin (fig. 114A); discal cell of forewing mainly dark, with a few white, intersecting lines only (pl. 1); process of pygophore of male large, subrectangular, faintly emarginated apically (fig. 114J) . . . . . *mirabundus*

Fore femur with very short inconspicuous spines only (as shown in fig. 114T); hind lobe of pronotum not tuberculate; discal cell of forewing with numerous small spots (as shown in figs. 112W; 115L); process of pygophore of male pointed apically (as shown in fig. 113J) . . . . . *barberi*

5. Pronotum tuberculate at middle before hind margin 6

Pronotum not tuberculate at middle before hind margin 11

6. Some spines of basal portion of fore femur very conspicuous, their length almost equal to that of diameter of femur (fig. 114X); large dark spots of forewing irrorated with minute clear dots . . . . . *parshleyi*

Spines of fore femur much shorter than diameter of segment (fig. 112A, L); dark spots of forewings not irrorated with clear dots 7

7. Process of middle of pronotum very small . 8

Process of middle of pronotum large (figs. 112 O; 114V) 9

8. Linear whitish vittae of disc of hind lobe of pronotum rather narrow, continued before front of constriction . . . . *subparallelus*

White vittae of disc of hind lobe of pronotum wide, not extending to fore lobe; structural characters as shown in figure 112A–K . . . . . *culiciformis*

9. Hind wings conspicuously spotted with dark apically; abdomen ventrally with distinct, large, bare spots around base of macrochaetae . . . . . *errabundus*

Hind wings not spotted apically; ventral pubescence of abdomen apparently uniform 10

10. Pronotum with two conspicuously curved, linear, pilose, white vittae which are distinct in front of constriction; bases of forewings white . . . . . *nudus*

Pronotum with two moderately broad, whitish vittae which do not extend in front of constriction or to hind margin, disc with rather conspicuous, white, decumbent hairs; process of pygophore of male spinelike . . . . . *armatus*

11. Pterostigma linear, entirely black; portion of M closing discal cell apically almost perpendicular to longitudinal axis of forewing (fig. 113T); cross veins of hind wing forming a straight line (fig. 113U) . *winnemana*

Pterostigma widened, not linear (figs. 112DD; 115L), portion of M closing discal cell clearly oblique in relation to longitudinal axis of forewing (figs. 112DD; 115L); cross veins of hind wings forming an angular line (fig. 115M) 12

12. Hind wings conspicuously spotted apically; lateral carinae of pronotum in most specimens with a small, laterally or anteriorly projecting process (fig. 112EE–MM); veins closing discal cell of forewing in most cases (but not all) almost symmetrical (fig. 112DD); pterostigma more or less extensively darkened . . . . . *orthoneuron*

Hind wings not spotted apically, at most faintly darkened; lateral carinae of pronotum lacking anterior projection; veins closing discal cell of forewing not symmetrical, Cu more strongly curved than M (fig. 115L); pterostigma darkened or not . .13

13. Pterostigma uniformly whitish (fig. 115L); parameres of male simple, pointed apically (fig. 115U) 14

Pterostigma with two or three dark spots (fig. 112F); parameres of male bilobed apically (fig. 112D, H, I) . . *culiciformis*

14. Antennae and femora of mid and hind legs with short hairs only, former not longer than diameter of antennal segments . . . . . *vagabundus*

Antennae and femora of mid and hind legs with conspicuous long hairs, former about

four times as long as diameter of antennal segments . . . . . *pilosus*

Empicoris palmensis Blatchley (1926) is not included because of lack of sufficient data.

It has not been possible to prepare original keys for Old World species of *Empicoris*, owing to lack of material and frequently insufficient descriptions. Dispons and Stichel (1959) offered a key to European and North African species, McAtee and Malloch (1926) gave one for Philippine and Malayan forms, and Villiers published keys in various papers on African species of *Empicoris*.

Empicoris aculeatus (Bergroth)

Ploeariodes aculeatus BERGROTH, 1926, p. 675.
Empicoris aculeatus: MYERS AND CHINA, 1928, p. 381.

DISTRIBUTION: New Zealand.
TYPE: Unknown.

Empicoris angolanus Villiers

Empicoris angolanus VILLIERS, 1952c, p. 33, fig. 22.

Distribution: Angola.
TYPE: Muséum National d'Histoire Naturelle.

Empicoris angulipennis (Bergroth)

Ploeariodes angulipennis BERGROTH, 1926, p. 676.
Empicoris angulipennis: MYERS AND CHINA, 1928, p. 382.

DISTRIBUTION: New Zealand.
TYPE: Unknown.

Empicoris armatus (Champion)

Figure 114V

Ploiariodes armata CHAMPION, 1898a, p. 165, pl. 10, figs. 9, 9a, 9b.
Empicoris armatus: MCATEE AND MALLOCH, 1925, p. 20, fig. 8.
Ploeariola mansueta BERGROTH, 1922b, p. 80.

The lateral aspect of the head and prothorax of a specimen from Jamaica is illustrated here.

DISTRIBUTION: United States (Florida); Jamaica; Puerto Rico; Guatemala; Panama.
TYPES: Of *armatus*, British Museum (Natural History); of *mansueta*, the California Academy of Sciences.

Empicoris baerensprungi (Dohrn)

Ploiaria baerensprungi DOHRN, 1863, p. 60.
Ploiariola baerensprungi: LETHIERRY AND SEVERIN, 1896, p. 69.
[*Empicoris*] *baerensprungi:* CHINA, 1943, p. 249.

DISTRIBUTION: England; France; Germany; Netherlands; Switzerland; Czechoslovakia; Yugoslavia; southern Russia; Algeria.
TYPE: Unknown.

Empicoris bakeri McAtee and Malloch

Empicoris bakeri MCATEE AND MALLOCH, 1926, p. 429, fig. 31.

DISTRIBUTION: Philippines.
TYPE: Male, United States National Museum.

Empicoris barberi (McAtee and Malloch)

Ploiariodes barberi MCATEE AND MALLOCH, 1923, p. 7.
Empicoris barberi: MCATEE AND MALLOCH, 1925, p. 19.

This species lacks spines on the mesonotum and metanotum, but the spine of the first abdominal tergite is well developed.

MATERIAL EXAMINED: *Cuba*: Soledad near Cienfuegos, August 6–20 (N. Banks; Museum of Comparative Zoölogy), one male. *Puerto Rico*: Ponce, June 20, 1948 (the American Museum of Natural History), one male. *Peru*: Junín, Satipó-Jauja, July 22, 1940, 800–900 meters (P. Paprzycki; the American Museum of Natural History), one male.

DISTRIBUTION: Puerto Rico; Cuba; Peru.
TYPE: Male, the American Museum of Natural History.

Empicoris bilineatus McAtee and Malloch

Empicoris bilineatus MCATEE AND MALLOCH, 1926, p. 429, fig. 30.

DISTRIBUTION: Philippines.
TYPE: United States National Museum.

Empicoris binodosus Villiers

Empicoris binodosus VILLIERS, 1952c, p. 33, fig. 21.

DISTRIBUTION: Angola.
TYPE: Muséum National d'Histoire Naturelle.

Empicoris brachystigma (Horváth), new combination

Ploiariola brachystigma HORVÁTH, 1914a, p. 644, fig. 6.
Ploiariola hirayami FUKUI, 1926, p. 11, fig. 2.

DISTRIBUTION: Japan.

TYPES: Of *brachystigma*, Hungarian National Museum; of *hirayami*, unknown.

Empicoris brevispinus (Puton)

Ploiariola brevispina PUTON, 1889, p. 304.
Empicoris brevispinus brevispinus: DISPONS, 1955, p. 173.
Ploiariodes brevispina v. *chobauti* REUTER, 1900, p. 186.
Empicoris brevispinus Chobauti: DISPONS, 1955, p. 173.

The difference between the nominate form and the "var." *chobauti*, viz., the various degrees of development of the humeral salience, does not seem to warrant taxonomic recognition. Ribes (1961) gave a habitus figure of the species.

DISTRIBUTION: France; Spain; Madeira; Canary Islands; Morocco; Algeria.

TYPE: Unknown.

Empicoris canaliculatus Villiers

Empicoris canaliculatus VILLIERS, 1960e, p. 29, fig. 17.

DISTRIBUTION: Madagascar.

TYPE: Male, Muséum National d'Histoire Naturelle.

Empicoris cornutus Villiers

Empicoris cornutus VILLIERS, 1960e, p. 27, fig. 15.

DISTRIBUTION: Madagascar.

TYPE: Female, Muséum National d'Histoire Naturelle.

Empicoris culiciformis (De Geer)

Figures 3N; 112A–K

Cimex culiciformis DE GEER, 1773, p. 223, pl. 17, figs. 1–8.
Ploiaria culiciformis: BAERENSPRUNG, 1860, p. 21.
Ploiariola culiciformis: REUTER, 1888, p. 713.
Ploiariodes culiciformis: MCATEE AND MALLOCH, 1922, p. 95.
Empicoris culiciformis: MCATEE AND MALLOCH, 1925, p. 23, figs. 9, 10..
Ploiaria alata SCOPOLI, 1786 (1786–1788, vol. 1), p. 51, pl. 25, figs. 6–10.
Gerris erraticus FALLÉN, 1807, p. 117.
Ploiaria erratica: HERRICH-SCHAEFFER, 1835, p. 62.
Ploiaria maculata HALDEMAN, 1847, p. 151.
Ploiariola errabunda: NATHAN BANKS, 1909, p. 46 (*nec* Say).
Ploiaria culiciformis var. *noualhieri* PUTON, 1887, p. 101.
Empicoris culiciformis var. *noualhieri:* DISPONS AND STICHEL, 1959, p. 96.

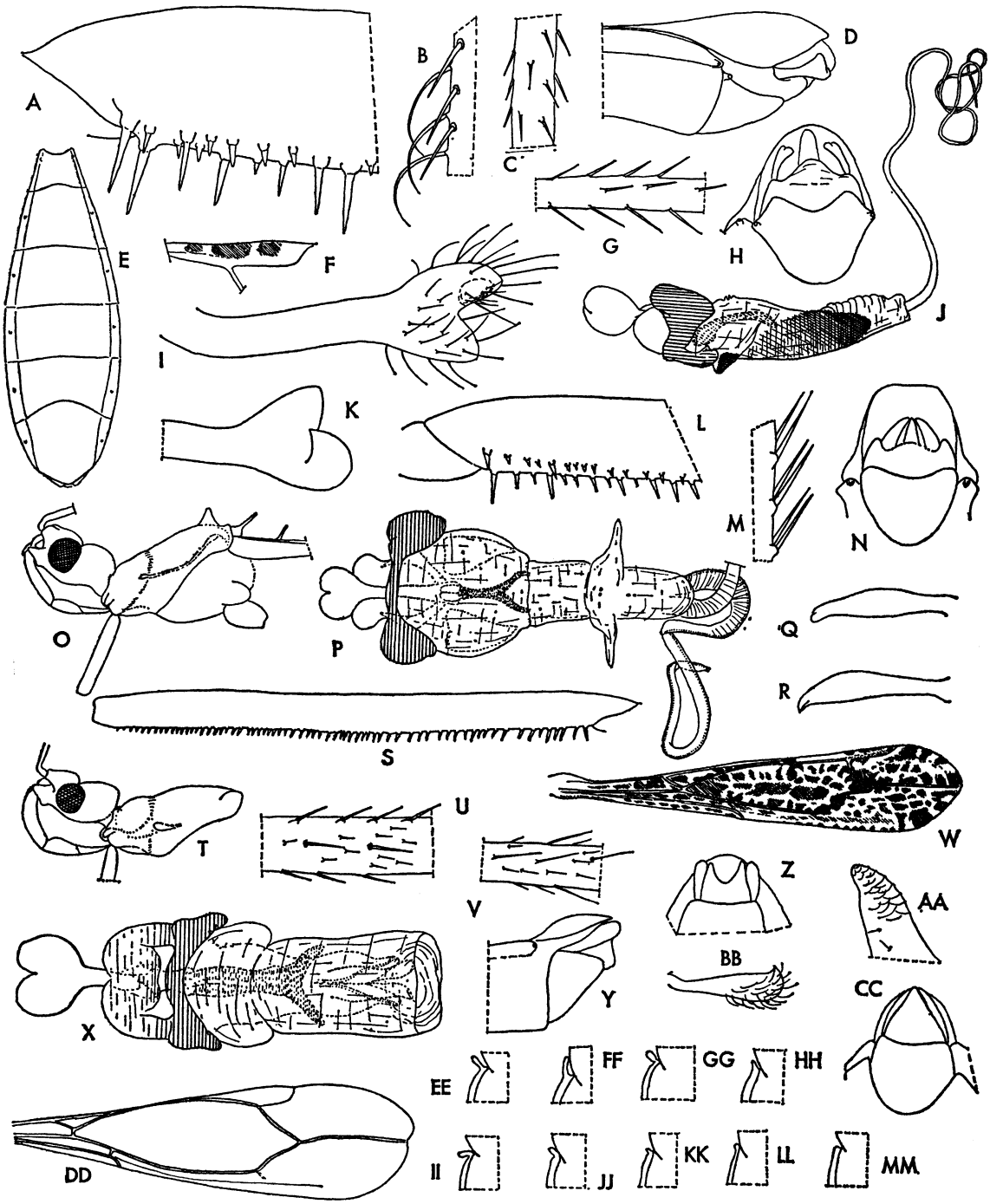
Some of the structural details of *culiciformis* are illustrated here. The fore femora possess several relatively large spines on the basal portion(fig. 112A). The fore tibia bears ventrally one series of curved, and one of straight, strong setae (fig. 112B); the setae of the mid and hind femora and tibiae are of uniform, medium long type (fig. 112C, G). The apically bilobed parameres are quite typical (fig. 112D, H, I),though a somewhat similar condition seems to obtain in *E. thermalis*. The phallus is shown in figure 112J; the basal portion of the phallotheca possesses 1+1 well-developed, lateral, triangular sclerotizations; the vesica arms are long and slender.

Dispons (1960a) called attention to the fact that in some specimens there is an indication of a small tubercle at the center of the hind border of the pronotum; the same has been observed in New World specimens. As a consequence, the species has been placed in two different places in the above key.

No structural characters have been described that would separate *culiciformis culiciformis* from *c. noualhieri*. The latter does not seem to warrant independent taxonomic status.

This species has a wide range over the western Palearctic and North America, but has also been found in the temperate zones of southern South America. It has most probably been dispersed by man.

MATERIAL EXAMINED: United States: Oregon: Jefferson County: Deschutes River, 14 miles west of Madras, February 28, 1959, bark of dead willow (J. Schuh; Oregon State University), one male; Clocharnas Lake, July 20, 1940 (Fender; University of Arizona), one female; Josephine County: Wilderville, June 9, 1962 (C. W. O'Brien; the


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF
GG
HH
II
JJ
KK
LL
MM

American Museum of Natural History), one male.

DISTRIBUTION: Europe; Azores; North Africa; Israel; Turkestan; United States; Chile; Argentina.

TYPES: Of *culiciformis*, De Geer collection, Naturhistoriska Riksmuseet; of *maculata*, United States National Museum.

Empicoris discalis McAtee and Malloch

Empicoris discalis MCATEE AND MALLOCH, 1926, p. 130, fig. 32.

DISTRIBUTION: Malaya.

TYPE: Male, British Museum (Natural History).

Empicoris errabundus (Say)

Figure 112L–R

Ploiaria errabunda SAY, 1832 (1831–1832), p. 34.

Ploiariola errabunda: VAN DUZEE, 1916, p. 27.

Ploiariodes errabunda: MCATEE AND MALLOCH, 1922, p. 95.

Empicoris errabundus: MCATEE AND MALLOCH, 1925 p. 24, figs. 11–13.

Ploiariodes tuberculata NATHAN BANKS, 1909, p. 46.

Ploiariola tuberculata: VAN DUZEE, 1916, p. 27.

I follow McAtee and Malloch (1925) in their opinion as to the identity of this species, though I do not ignore the fact that Blatchley (1926) considered the species described as *parshleyi* by Bergroth (1922b) as the true *errabundus*, and that *tuberculata* should be used for *errabundus*, *sensu* McAtee and Malloch.

Some structural features of *errabundus* are illustrated. The setae of the under surface of the fore tibia (fig. 112M) are of a single type; they are short and straight. The setae of the mid and hind femur and tibiae (not shown) are equally of a single type, similar on both articles. The subtriangular lateral sclerotizations of the basal portion of the phallotheca are well developed (stippled lines in fig. 112P); there are 1+1 membranous processes on the limit between the phallotheca and the conjunctiva (fig. 112P).

MATERIAL EXAMINED: United States: Maine: Paris, July 4, 1916 (C. A. Frost; the California Academy of Sciences), one male, four females; (C. A. Frost; the American Museum of Natural History), one female. Virginia: Herndon, August 1911 (Barber; the California Academy of Sciences), two males. Washington: King County: Northbend, July Academy of Sciences), one male. Oregon: Corvallis, June 11, 1925 (E. P. Van Duzee; the California Academy of Sciences), five males; (E. P. Van Duzee; the American Museum of Natural History), one male.

DISTRIBUTION: United States; Mexico; Jamaica.

TYPES: Of *errabunda*, unknown; of *tuberculata*, the American Museum of Natural History.

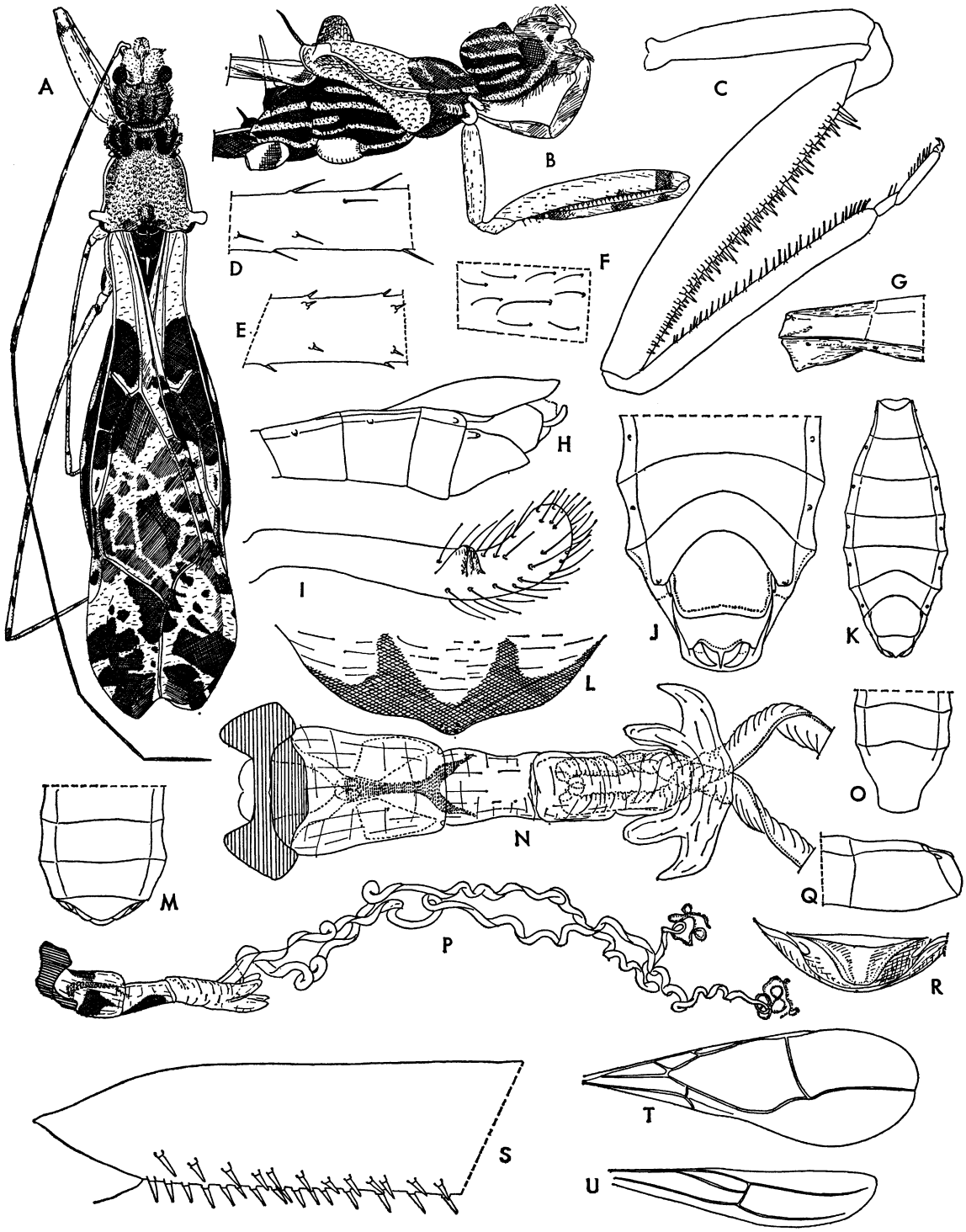
Empicoris fakoanus Villiers

Empicoris fakoanus VILLIERS, 1948, p. 433, figs. 830, 831.

DISTRIBUTION: Cameroon.

TYPE: Female, Muséum National d'Histoire Naturelle.

FIG. 112 (OPPOSITE PAGE). A–K. *Empicoris culiciformis*. A. Base of fore femur. B. Detail of under surface of fore tibia. C. Portion of hind femur. D. Apex of abdomen of male, lateral view. E. Abdomen of female, ventral aspect. F. Pterostigma, with color pattern. G. Portion of hind tibia. H. Genital region of male, inferoposterior view. I. Paramere. J. Phallus, lateral view, only one vesica arm shown. K. Apex of paramere, different view from that in I; setae not shown. L–R. *Empicoris errabundus*. L. Base of fore femur. M. Setae of under surface of fore tibia. N. Genital region, inferoposterior view. O. Anterior portion of body of female, lateral aspect. P. Phallus, dorsal view; only one vesica arm shown entirely. Q, R. Paramere, different views; setae not shown. S–Z, AA, BB. *Empicoris rubromaculatus*. S. Fore femur. T. Head and prothorax of female, lateral aspect. U. Portion of posterior femur. V. Portion of hind tibia. W. Forewing, with color pattern. X. Phallus, dorsal view; endosoma not everted. Y. Genital region of male, lateral aspect. Z. Genital region of male, inferoposterior view. AA. Apex of left process of pygophore, high magnification. BB. Paramere. CC–MM. *Empicoris orthoneuron*. CC. Genital region of male, inferoposterior view (type of *Empicoris reticulatus*). DD. Venation of forewing of specimen from Mormon Lake, Arizona. EE–MM. Anterior extremity of lateral carina of pronotum, dorsolateral view, different specimens. EE. King City, California. FF. Different specimen from King City. GG. Mill Valley, California. HH. Rustlers' Park, Arizona, II. Carmel, California. JJ. Canyonville, Oregon. KK. Hat Creek, California. LL. San Antonio, Texas. MM. Zephyr Lake, Nevada.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U

Empicoris gracilentus (Jakovlev)

Ploeariola gracilenta JAKOVLEV, 1906a, p. 158.
Empicoris gracilentus: DISPONS AND STICHEL, 1959, p. 97.

DISTRIBUTION: Southern Russia.
TYPE: Unknown.

Empicoris greeni (Bergroth), new combination

Ploiariola oculata: DISTANT, 1903e, p. 202, fig. 141 (part).
Ploeariola greeni BERGROTH, 1914b, p. 187.
Ploiariola distinguenda HORVÁTH, 1914a, p. 643 (new synonymy).

Bergroth (1914b) and Horváth (1914a) both recognized at almost the same time that the species illustrated by Distant (1903e) was not the same as *Ploiaria oculata* Reuter (1881) with which Distant had identified it, and proceeded independently to rename it. Bergroth's paper antedates that by Horváth.

This species seems to be quite different from other species of *Empicoris* and may not really belong in that genus.

DISTRIBUTION: Ceylon.
TYPE: Unknown.

Empicoris incredibilis, new species

Plate 3, figure 7; text figure 113A–R

DESCRIPTION: Male and female: Length, 4.2–4.4 mm.

General color ochraceous to piceous, pattern elements white. Fore lobe of head ochraceous, hind lobe fulvous, changing to piceous on sides. Rostrum ochraceous, first and second segments extensively darkened at middle. Fore lobe of pronotum fulvous, hind lobe ochraceous, slightly darker along lateral carinae and on posterior process; anterior acetabula white; lateral carina and projection of humerus white. Scutellum and metanotum castaneous, spine of scutellum ochraceous, of metanotum whitish. Mesopleura and metapleura and sterna piceous. Abdomen castaneous to piceous; anterior half of connexival segments whitish dorsally, ochraceous ventrally. Eighth and ninth sternites of male narrowly margined with whitish behind; spiracles white; parameres dark on basal, whitish on apical, half. Antennae dark, first and second segments each with about eight narrow whitish annuli; base of first segment white. General color of legs stramineous to white. Coxae and trochantera of forelegs lacking dark spots or annuli; femora with a submedian spot ventrally and an apical annulus dark; tibiae with three dark annuli, one subbasal, one submedian, and one apical (fig. 113B). Coxae of hind legs darkened at middle; femora of mid and hind legs with six to eight brownish annuli which are shorter than intervening white regions; tibiae dark on apical third, remainder with about 15 dark annuli which are from slightly narrower to distinctly wider than intervening light-colored regions. Forewings whitish, their pattern as shown in figure 113A; spots basad and apicad of discal cell fuscous, those in cell mostly ochraceous. Hind wings iridescent, darkened at extreme apex. Head, fore lobe of pronotum, mesopleura, and metapleura with adpressed, silvery white, wool-like pubescence forming very conspicuous stripes laterally on head and thorax (fig. 113B; pl. 3, fig. 7) and dorsally on fore lobe of pronotum. Shorter and less conspicuous adpressed setae on head dorsally and on ventral surface of mesothorax and metathorax. Pubescence of ventral surface of abdomen short, adpressed, numerous rather faint bare spots at insertion of larger setae; median longitudinal line bare, this line somewhat widened at anterior portion of each sternite. Body surface faintly shining.

Head as shown in figure 113A, B. Postocular portion longer than anteocular, depressed longitudinally along middle, with a small tubercle centrally behind interocular furrow. Eyes subsemicircular, small in both sexes,

FIG. 113 (OPPOSITE PAGE). A–R. *Empicoris incredibilis.* A. General aspect, with color pattern. B. Anterior portion of body, lateral view, with color pattern. C. Foreleg. D. Portion of posterior tibia. E. Portion of hind femur. F. Setae of abdominal sternite. G. Base of abdomen of male, dorsolateral view. H. Apical portion of abdomen of male, lateral aspect. I. Paramere. J. Apical portion of abdomen of male, ventral view. K. Abdomen of male, ventral aspect. L. Syngonapophysis. M. Apex of abdomen of female, dorsal aspect. N. Phallus, dorsal aspect; only base of vesica arms shown. O. Apex of abdomen of male, dorsal aspect. P. Phallus; endosoma completely everted. Q. Apex of abdomen of female, side view. R. Genital region of female, seen from behind. S. *Empicoris xambeui,* base of fore femur. T, U. *Empicoris winnemana.* T. Forewing. U. Hind wing.

their height equal to half of that of head in lateral aspect; distance between eyes two and one-half times their width in dorsal view. Interocular furrow extending slightly behind level of posterior border of eyes. Rostrum as shown in figure 113B. Antennae bare in both sexes. First segment 2.3 mm., attaining middle of forewings; relative length of segments, 1/0.95/0.31/0.2.

Thorax as shown in figure 113A, B. Fore lobe of pronotum half as long as hind lobe and half as long as wide, bare portions microscopically reticulate, its center rather deeply impressed. Hind lobe slightly wider than long; posterior margin distinctly emarginated at middle; humeral angles with 1+1 laterally projecting, flaplike, horizontal projections. Lateral carinae complete, originating posteriorly from humeral projections, anterior extremity shortly salient. Process of hind border of pronotum large, subcylindrical, slightly compressed laterally, rounded at apex. Surface of hind lobe coarsely and irregularly punctate, including surface of posterior process. Spines of scutellum and metanotum long and slender, subvertical, slightly inclined backward. Spine of basal abdominal tergite well developed, but much shorter than spines of thorax.

Forelegs stout (fig. 113C). Coxa as long as hind lobe of pronotum, its setae simple, shorter than diameter of segment. Femur six to eight times as long as maximum width. Ventral series composed of slender spines inserted on short, conical processes; basal processes and their spines longest, but invariably considerably shorter than diameter of segment. Both series composed of about 30 processes. Tibiae four-fifths as long as femur, ventrally with two rows of obliquely inclined, straight, slender, spinelike setae. Tarsus and claws like those of remaining species of genus, spiniform setae of ventral surface of tarsus slender. Posterior femora surpassing apex of forewings by 0.2–0.5 mm. Mid and hind legs lacking long hairs, both with uniform short setae, those of femur almost spinelike (fig. 113E), those of tibiae longer (fig. 113D). Tarsi and claws like those of *vagabundus* (see fig. 115K).

Forewings surpassing apex of abdomen by less than 0.5 mm.; their pattern and venation as shown in figure 113A. Pterostigma not narrowed. Apex of forewings deeply notched; their surface delicately rugose, dark portions slightly embossed.

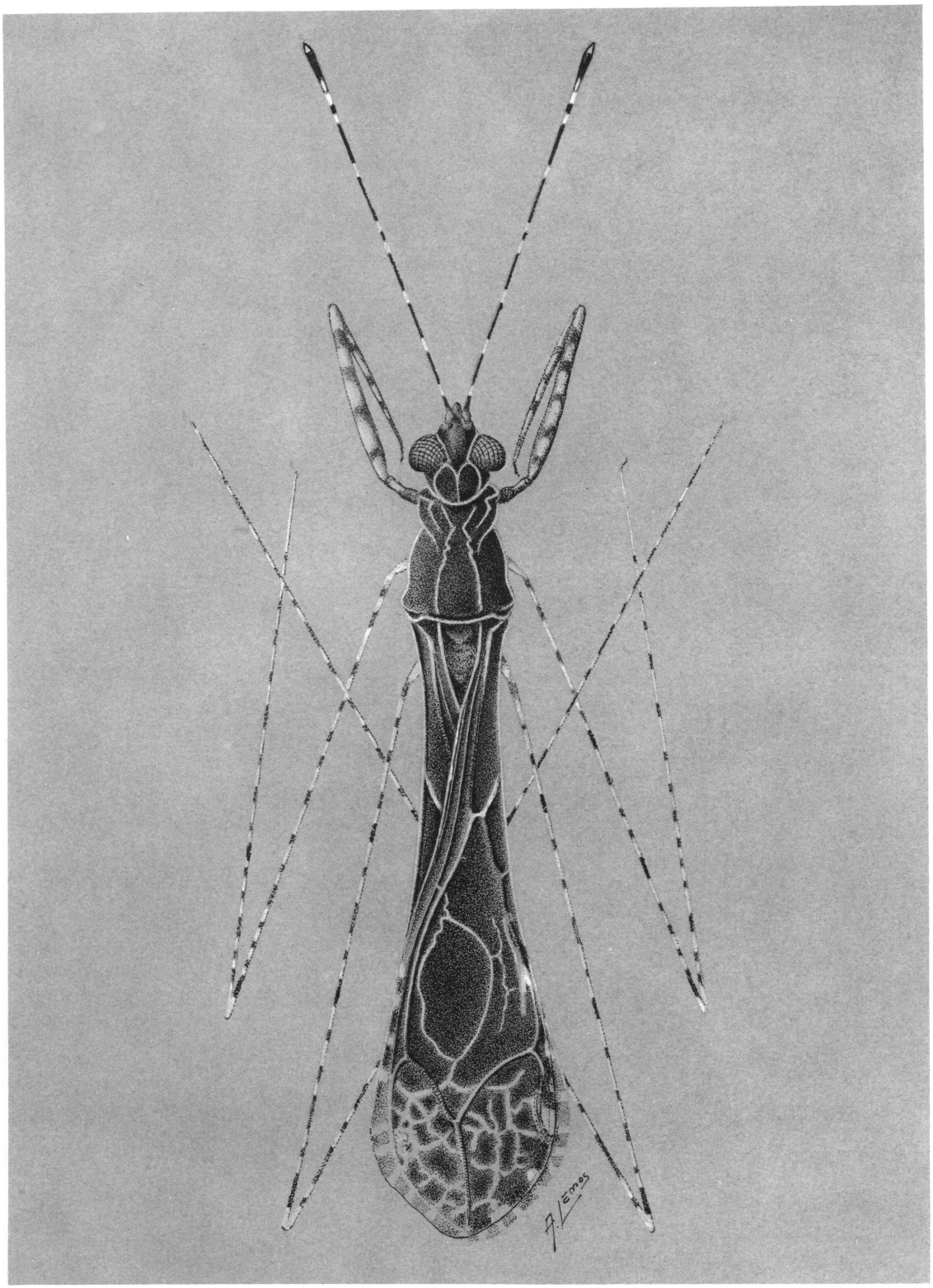
Abdomen oval in both sexes (fig. 113K), sides slightly undulating. Ventral surface minutely striate-reticulate. Posterior border of basal sternite straight. First tergite with short, slender spine (fig. 113B), extremely short in single male examined (fig. 113G). Macrochaetae and microchaetae of sternites and tergites as shown in figure 113F.

Male: Genital region as shown in figure 113H, J, K, O. Last tergite with sides convergent, subparallel distally, apical margin rounded-truncate. Eighth sternite large, its posterior border very faintly emarginated. Pygophore with a short, slender, pointed process. Parameres (fig. 113I) subcylindrical, curved apically; medially on inner surface with a short, more heavily sclerotized projection. Phallus as shown in figure 113N, P. Proximal portion of phallotheca slightly but distinctly sclerotized dorsally, and with 1+1 large, lateral, subtriangular sclerotizations. Apical portion sclerotized on ventral surface only.

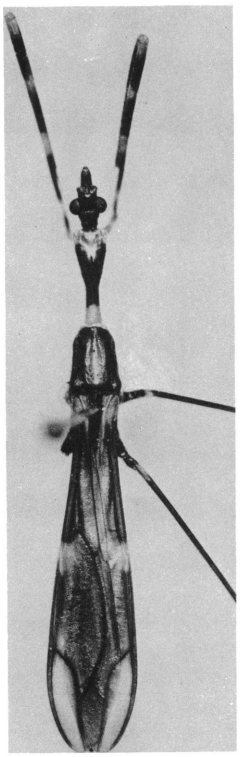
Distal portions of arms of fused struts very narrow. Conjunctiva with 2+2 large, apical, membranous projections. Vesica arms exceedingly elongate, when fully extended probably much longer than abdomen; rather wide on most of their extension, abruptly narrowed near apex.

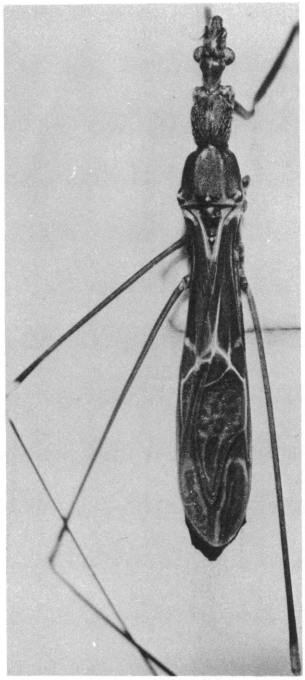
Female: Genital region as shown in figure 113M, Q, R. Eighth tergite transverse, rounded apically. Ninth tergite subtrapezoidal, slightly elevated longitudinally along middle. Gonocoxites and gonapophyses much as in *vagabundus* (see fig. 115W), but setae along hind border of gonocoxites stronger. Syngonapophysis as shown in figure 113L.

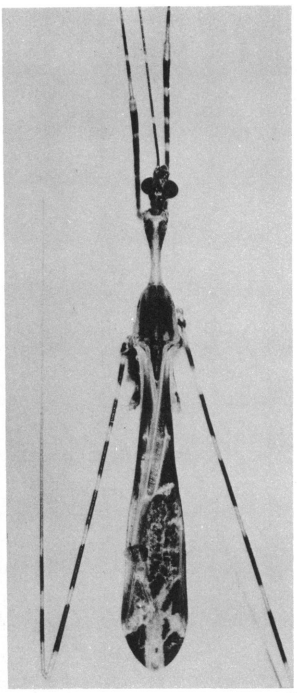
MATERIAL EXAMINED: United States: Arizona: White House Canyon, Santa Rita Mountains, October 13, 1936, 5000 feet (J. R. Torre Bueno; the University of Kansas), one male holotype, one female allotype, three female paratypes (J. R. Torre Bueno; the American Museum of Natural History), one female paratype; Ramsey Canyon, Huachuca Mountains, July 28, 1959 (Werner and others; University of Arizona), one female paratype; Huachuca Mountains, July, 1925

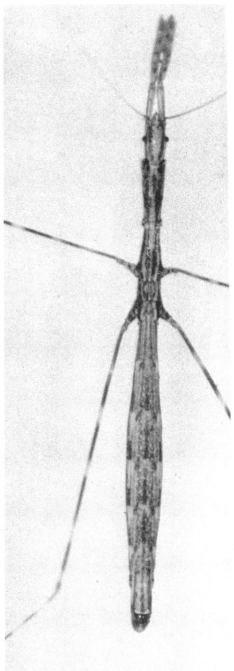


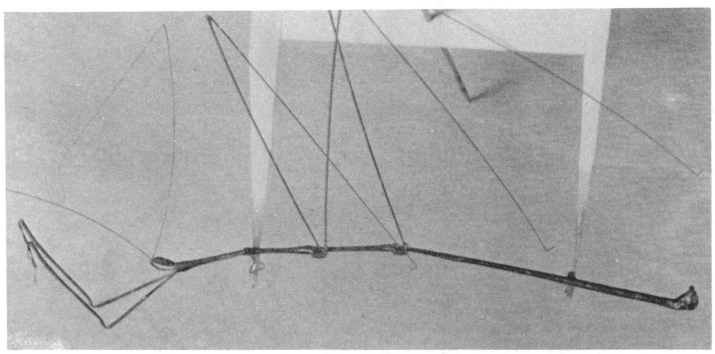
Empicoris mirabundus. Drawing by Antonio de Lemos Pereira

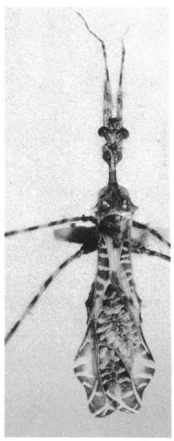

1

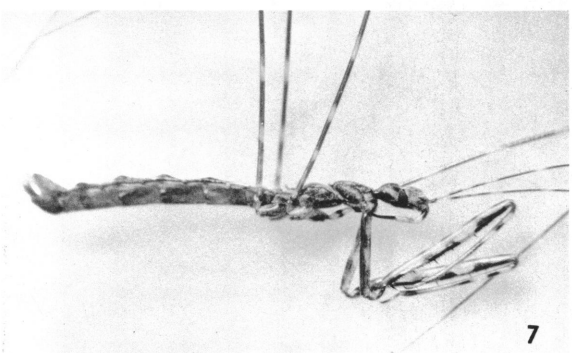

2

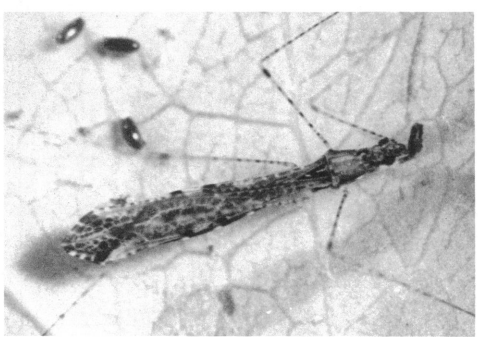

3


4

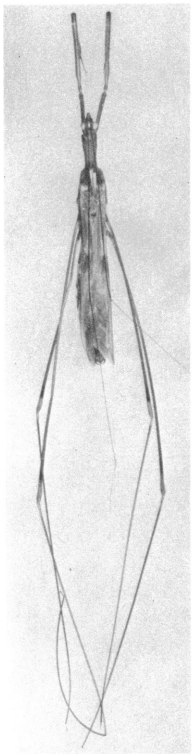

5

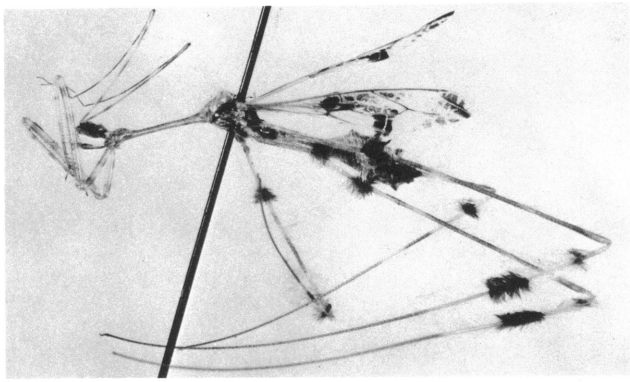

6

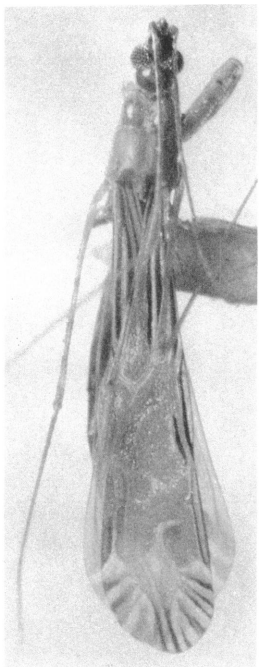

7

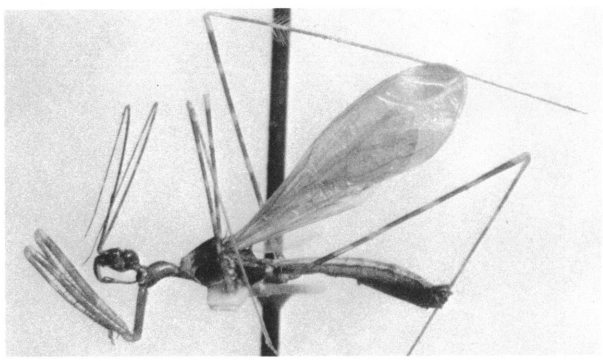

8

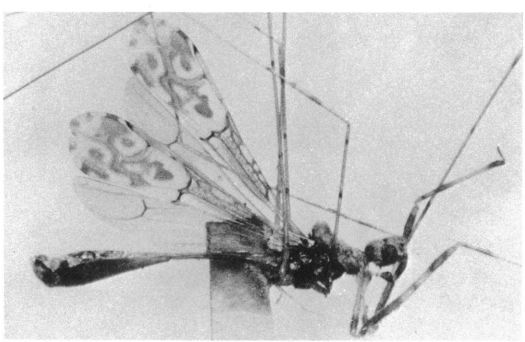
1. *Amilcaria lapinhaensis*. 2. *Phasmatocoris praecellens*. 3. *Dohrnemesa santosi*. 4. *Barce fraterna banksii*, apterous male. 5. *Ischnobaenella* sp., male. 6. *Stenolemus minensis*. 7. *Nesidiolestes roberti*, male. 8. *Empicoris rubromaculatus*, female with eggs

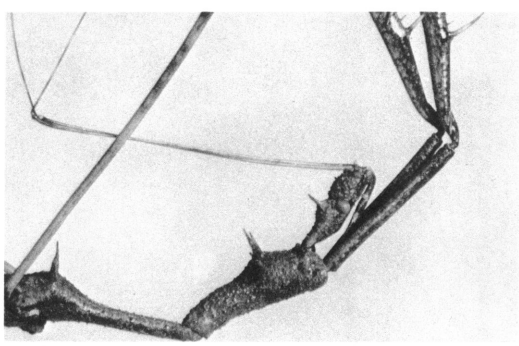


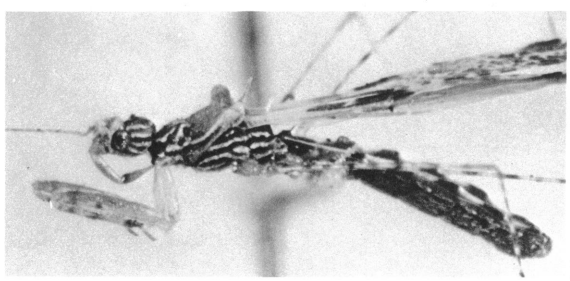




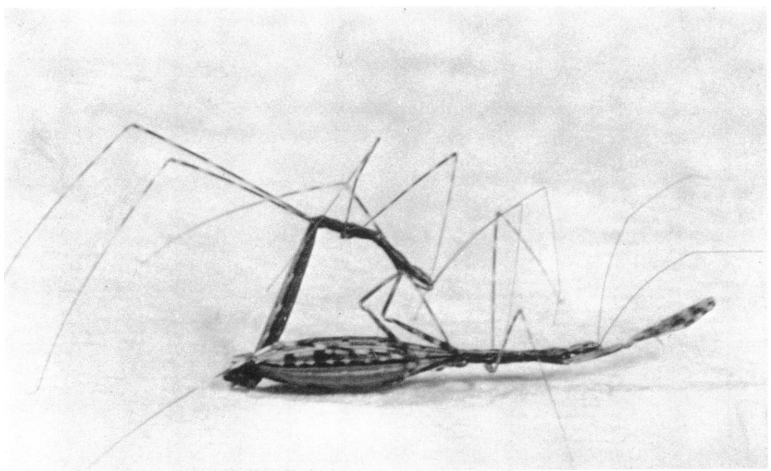


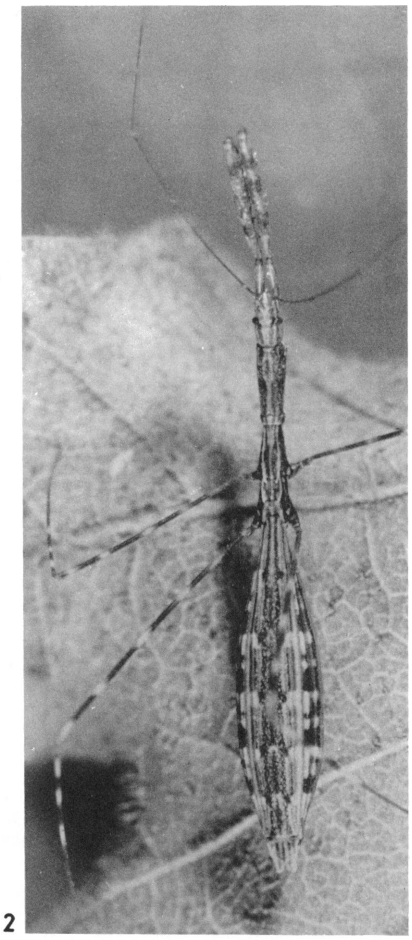


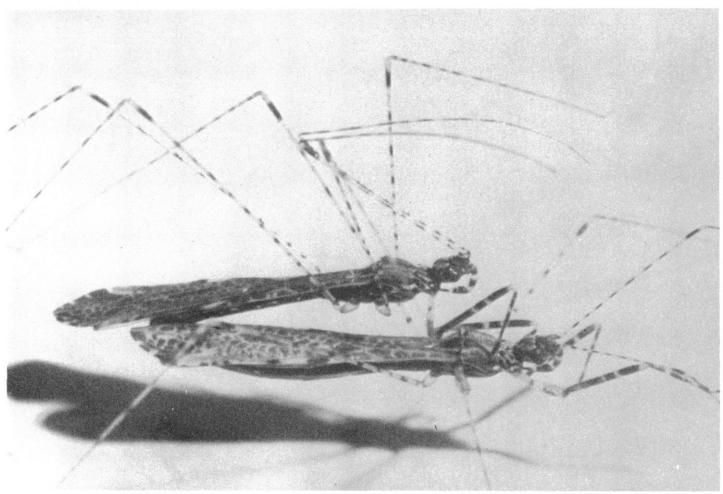


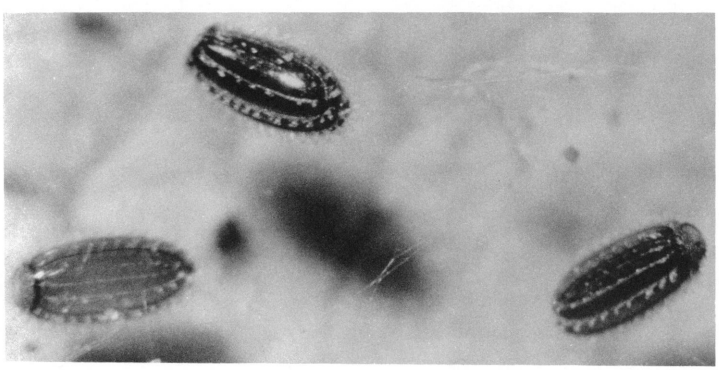


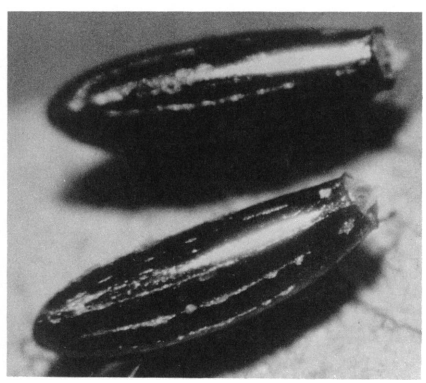
1. *Bagauda creppei.* 2. *Stenolemus fasciculatus.* 3. *Calphurniella stheno.* 4. *Stenolemoides arizonensis.*
5. *Emesopsis plagiatus.* 6. *Ghilianella spinata.* 7. *Empicoris incredibilis*











1, 2. *Barce fraterna banksii*. 1. Male and female *in copula*. 2. Female. 3, 4. *Empicoris rubromaculatus*. 3. Male and female *in copula*. 4. Eggs, suspended on psocid silk strands. 5. *Barce fraterna banksii*, eggs

(United States National Museum), two female paratypes; (the American Museum of Natural History), one female paratype.

OBSERVATIONS: This unique species differs from all known species of *Empicoris*, among other characters, by the flaplike projections on the humeri. The extremely elongate vesica arms of the phallus are remarkable, but the genitalia of only a few other species of the genus have been examined and are available for comparison.

Empicoris lavatus McAtee and Malloch

Empicoris lavatus MCATEE AND MALLOCH, 1926, p. 130.

DISTRIBUTION: Philippines.
TYPE: Male, United States National Museum.

Empicoris lindbergi Villiers

Empicoris lindbergi VILLIERS, 1957c, p. 3, figs. 1, 2.

DISTRIBUTION: Cape Verde Islands.
TYPE: Museum Zoologicum Universitatis.

Empicoris mediterraneus Hoberlandt

Empicoris mediterraneus HOBERLANDT, 1955, p. 74, figs. 23–28.

DISTRIBUTION: Turkey; Israel; Egypt.
TYPE: Male, National Museum, Prague.

Empicoris melanacanthus (Horváth)

Ploiariola melanacantha HORVÁTH, 1892, p. 139.
Empicoris melanacanthus: DISPONS, 1955, p. 173.

DISTRIBUTION: France; Morocco.
TYPE: Unknown.

Empicoris minutus Usinger

Empicoris minutus USINGER, 1946, p. 45.

The following discussion is intended to show that in the Emesinae, as in any other group of animals, specific distinctions are not always clearcut. The present example has been analyzed in some detail; others have been found in the course of the present work.

It is with some hesitancy that *Empicoris minutus* is here maintained as a valid species.

TABLE 5

CHARACTERS OF REPRESENTATIVE SPECIMENS OF THE *Empicoris rubromaculatus-minutus* GROUP

Localities and Sex of Specimens Examined	Length to Apex of Forewings (in Mm.)	Relation of Length of First to Second Antennal Segments	Relation of Length of Subapical Annulus of Hind Femur to Apical White Portion	Relation of Apical Width of Emargination of Pygophore to Depth of Emargination	Color of Scutellar Spine
Inverness, California (♂)	5.5	1.06	1.8	—	White
José C. Paz, Argentina (♂)	5.0	1.05	2.0	1.4	White
Dundo, Angola (♂)	5.0	1.0	2.0	0.75	?
Annapolis, Maryland (♂)	4.8	1.0	1.6	1.2	White
Km. 47, Rio de Janeiro (♂)	4.7	1.0	2.0	0.85	White
Moji, Japan (♂)	4.5	1.0	1.5	0.75	Dark
New Caledonia (♀)	4.5	1.03	2.35	—	Intermediate
Ponce, Puerto Rico (♂)	4.3	1.0	2.0	1.0	White
Thamati, Fiji (♂)	4.2	1.0	0.65	0.73	Dark
Navai Mill, Fiji (♂)	4.0	1.0	0.65	0.69	Dark
Bogan, River, New South Wales (♂)	4.0	1.0	1.5	1.2	White
Amouli, Samoa (♀)	3.8	1.0	0.65	—	Dark
Tapatapau, Samoa (?)	3.8	1.0	0.65	—	Dark
Loma Loma, Fiji (♀)	3.8	1.0	0.6	—	?
Vunuka, Fiji (♂)	3.8	1.0	0.65	0.7	?

As discussed by its author, *minutus* was said to differ from *rubromaculatus* by its smaller size, the fact that the first antennal segment was not longer than the second, the dark and semi-erect scutellar spine, the relatively short, subapical, dark annulus of the posterior femur, and the less divergent arms of the apical emargination of the pygophore of the male.

Examination of the phallus of a typical *minutus* (Vunuka, Fiji) has shown that it agrees perfectly with the very characteristic phallus of *rubromaculatus* (as shown in fig. 112X).

Examination of large series of the *rubromaculatus-minutus* complex (as exemplified in table 5) shows that, though many specimens can be named without trouble, others show a mixture of the characters supposedly typical for each species. The males from Angola and Rio de Janeiro, for instance, though to be considered as *rubromaculatus* on account of size and color characters, agree with *minutus* in the shape of the emargination of the pygophore. The Japanese specimen agrees with *rubromaculatus* in size and the extension of the subapical annulus of the hind femur, but with *minutus* as to the characters of the scutellar spine and pygophore. The specimen from New South Wales, typical for *rubromaculatus* in most respects, would be placed in *minutus* if size alone were taken into consideration. The relative size of the first antennal segment obviously does not merit consideration.

Although it is tempting to consider *minutus* as a synonym of *rubromaculatus*, as there is an apparent overlap in the not very significant differential characters, it cannot be ignored that all unequivocal specimens of *minutus* (size, 4.2 mm. or less; subapical dark annulus of posterior femur distinctly shorter than apical white portion; scutellar spine dark, semi-erect; emargination of pygophore deeper than wide at apex) are restricted to the Pacific and apparently are sympatric with true *rubromaculatus* in the Hawaiian Islands (Usinger, 1946; personal observations). It can be concluded that *minutus* and *rubromaculatus* share a recent common ancestor which might well be identical to one of the two species involved, and that a reproductive barrier has been established which keeps the Pacific *minutus* distinct from the cosmopolitan *rubromaculatus*.

MATERIAL EXAMINED: *Fiji*: Ovalau: Thawati, July 16, 1939, beating dead branches, 800 feet (E. C. Zimmerman; the American Museum of Natural History), one male; Lau group: Vanua Mbalavu: Loma Loma, August 5, 1938, beating shrubs, 200 to 500 feet (E. C. Zimmerman; Bernice P. Bishop Museum), one female; Viti Levu: Navai Mill, Nandarivatu, September 7, 1938, beating shrubbery (E. C. Zimmerman; Bernice P. Bishop Museum), one male; Viti Levu: Tholo-i-suva, July 27, 1938 (E. C. Zimmerman; Bernice P. Bishop Museum), one male; Viti Levu: Belt road, 15 miles west of Suva, July 22, 1938, beating dead branches (E. C. Zimmerman; Bernice P. Bishop Museum), one female; Moala: Vunuka, August 28, 1938, 100 feet (E. C. Zimmerman; the American Museum of Natural History), one male. *Marianas*: Saipan Island, near Lake Susupe, March 3, 1945 (Dybas; Bernice P. Bishop Museum), one male. *Samoa*: Upolu: Apia, June 3, 1940 (E. C. Zimmerman; Bernice P. Bishop Museum), one female; Upolu: Tapatapau, July 20, 1940, beating dead branches, 800 feet (E. C. Zimmerman; Bernice P. Bishop Museum), one female; Tutuila: Amouli, August 2, 1940, beating, 800 to 1000 feet (E. C. Zimmerman; Bernice P. Bishop Museum), one female.

DISTRIBUTION: Hawaiian Islands; Mariana Islands; Bonin Islands; Samoa; Fiji.

TYPE: Male, Bernice P. Bishop Museum.

Empicoris mirabundus, new species

Plate 1; text figure 114A–Q

DESCRIPTION: Male and female: Length, 4.5 mm.

General color castaneous. Pattern elements (pl. 1) stramineous to silvery white. Head with several narrow lines formed by very short, silvery pubescence: one dorsally along midline of postocular region, 1+1 submedian dorsal connected near posterior border of postocular and again behind interocular furrow, continued along inner margin of eyes, 1+1 lateral situated behind and 1+1 lateral before eyes. Fore lobe of pronotum with 3+3 longitudinal lines formed by silvery pubescence, inner and outer shortly continued on hind lobe; submedian and lateral carinae of latter white, as lateral and hind margin of

posterior lobe. All acetabula margined with white. Scutellum and metanotum dark. Abdomen dark, spiracles and narrow margin of connexivum whitish. Rostrum stramineous, segments spotted with dark as shown in figure 114A. First segment of antennae annulated with white as shown in plate 1; markings of second similar, third mostly clear colored, fourth mostly dark. Fore coxae with four dark spots, one basal, two submedian, and one apical; trochanter darkened apically; femur darkened at extreme base and with one wide subbasal, two narrow submedian, and one very wide subapical dark annuli; tibia with two widely spaced dark subbasal and two almost confluent apical annuli; base of second tarsal segment dark (fig. 114B). Coxae of mid and hind legs darkened laterally, trochantera ventrally; femora with about 14 dark incomplete and complete annuli of various widths, mostly narrower than intervening white spaces, their apices white; tibiae with approximately 18 narrow dark annuli. Pattern of forewings as shown in plate 1, characterized by restriction of extensive light reticulation to distal portion; apex of pterostigma often reddish. Hind wings iridescent, veins of apical half dark and bordered with dark.

Head and rostrum as shown in plate 1 and text figure 114A. Anteocular and postocular region subequal in length, latter not sulcate dorsally, lacking projections. Interocular furrow not attaining level of posterior border of eyes. Latter large in both sexes, almost attaining level of dorsal surface of head; in male attaining, in female somewhat remote from, level of ventral surface. Interocular distance dorsally in male somewhat less than, in female equal to, width of eyes. Antennae lacking long hairs in both sexes. First segment, 1.8 mm., attaining basal third of abdomen; relative length of segments, 1/1.1/0.27/0.19.

Thorax as shown in plate 1 and text figure 114A. Fore lobe of pronotum transverse, three times as wide as long; hind lobe more than twice as long as fore lobe, slightly wider than long. Fore lobe subshining, microscopically reticulate; hind lobe dull. Lateral carinae of hind lobe complete, narrow, their anterior extremity not salient; disc of hind lobe with 1+1 percurrent, submedian, narrow carinae similar in structure to lateral ones, before hind border at center with a short conical tubercle, slightly rounded apically. Scutellum and metanotum salient apically but lacking spine.

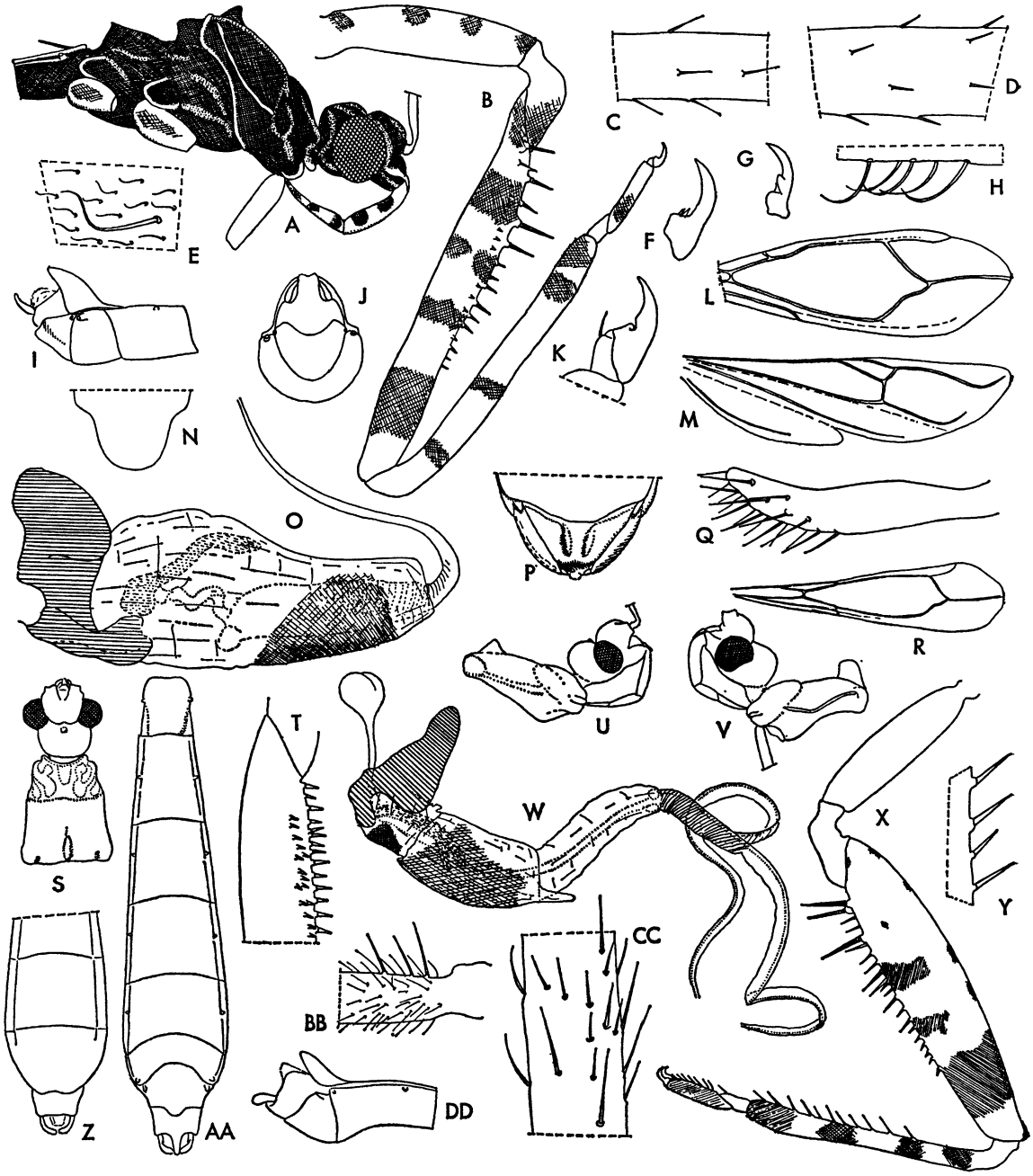
Forelegs as shown in figure 114B. Coxa somewhat shorter than hind lobe of pronotum. Femur stout, about seven times as long as maximum width. Posteroventral series composed of 15 to 20 large, medium-sized, and short spines inserted on short protuberances, largest situated at some distance from base. Anteroventral series composed of approximately identical number of spines, basal one very large, remainder very short. Tibia about four-fifths as long as femur, ventral setae uniformly curved, arranged in two series (fig. 114H). Ventral setae of tarsus slender. Claws as shown in figure 114F, K. Posterior femur attaining or slightly surpassing apex of forewings. Mid and hind legs lacking long hairs, setae of uniform type, those of femora (fig. 114D) somewhat shorter than those of tibiae (fig. 114C). Claws as shown in figure 114G.

Forewings surpassing apex of abdomen by 0.6–0.8 mm., their shape and venation as shown in figure 114L and plate 1. Pterostigma surpassing level of apex of discal cell, not narrowed. Venation of hind wing as shown in figure 114M.

Abdomen narrow, almost parallel-sided in male, slightly widened toward middle in female; lateral borders straight. First tergite with a well-developed, slender, backwardly inclined spine (fig. 114A). Pubescence of ventral surface interrupted by bare spots at base of insertion of larger setae. Microchaetae and macrochaetae as shown in figure 114E.

Male: Genital region as shown in figure 114I, J, N. Last tergite short, broadly rounded apically. Eighth sternite large, broadly emarginate behind. Process of pygophore broad, somewhat longer than wide, shallowly emarginated apically. Parameres slender, simple in structure, narrowed distally, with rather long setae. Phallus as shown in figure 114 O; basal portion of phallobase lacking sclerotized areas, apical portion sclerotized ventrally and at sides. Conjunctiva appendages lacking; vesica arms not more than twice as long as phallotheca, wide at base, gradually narrowed toward apical half.

Female: Eighth tergite subsemicircular;


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD

ninth conspicuously carinate longitudinally along middle (fig. 114P).

MATERIAL EXAMINED: Brazil: Estado do Rio: Nova Friburgo, January, 1946, 800 meters (Wygodzinsky; the American Museum of Natural History), one male holotype, one female allotype, two male, one female, paratypes; (Wygodzinsky; collection Usinger), one female; São Paulo: Osasco, August 10, 1944 (Wygodzinsky, the American Museum of Natural History), one female.

OBSERVATIONS: *Empicoris mirabundus* agrees with *E. barberi* in the lack of spines on the scutellum and metanotum and the presence of 1+1 narrow carinae on the disc of the hind lobe of the pronotum, similar in structure to the lateral ones. The more obvious differences between the two species are indicated in the key.

Empicoris morstatti (Schumacher)

Ploiariola morstatti SCHUMACHER, 1911, p. 107.
Empicoris morstatti: VILLIERS, 1949a, p. 282.

DISTRIBUTION: East Africa.

TYPE: Zoologisches Museum der Universität, Berlin.

Empicoris natalensis (Horváth)

Ploiariola natalensis HORVÁTH, 1914a, p. 641, fig. 3.
Empicoris natalensis: VILLIERS, 1949a, p. 285.

DISTRIBUTION: Natal.

TYPE: Hungarian National Museum.

Empicoris nudus McAtee and Malloch

Empicoris nudus MCATEE AND MALLOCH, 1925, p. 22.

DISTRIBUTION: United States (Florida).

TYPE: Female, United States National Museum.

Empicoris oculatus (Reuter), new combination

Ploiaria oculata REUTER, 1881, p. 70.
Ploiariola oculata: LETHIERRY AND SEVERIN, 1896, p. 69.

DISTRIBUTION: Ceylon.

TYPE: Unknown.

Empicoris ornatus Villiers

Empicoris ornatus VILLIERS, 1949a, p. 286.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Male, Musée Royal de l'Afrique Centrale.

Empicoris orthoneuron McAtee and Malloch
Figure 112CC–MM

Empicoris orthoneuron MCATEE AND MALLOCH, 1925, p. 18, figs. 4, 5.
Empicoris reticulatus MCATEE AND MALLOCH, 1925, p. 20 (new synonymy).

This species shows an extraordinarily wide range of variation, to judge from the specimens that I have examined. The size varies from 4 to 6 mm., independent of sex. The extension of the honeycombing of the forewings varies from almost nil to very extensive; the extension and intensity of the spots that make up the pattern of the forewings equally lack any degree of uniformity. The pterostigma is invariably more or less darkened, and the conspicuous spotting of the apex of the hind wing is constant. There is considerable variation in the proportions of the fore and hind lobe of the pronotum. The projection of the anterior extremity of the lateral carina of the posterior lobe of the pronotum shows various shapes and sizes (fig. 112EE–MM), from very large to being occasionally completely absent. The length and width of the forewings equally lack constancy. In some cases they considerably surpass the apex of the abdomen, in others they hardly attain

FIG. 114 (OPPOSITE PAGE). A–Q. *Empicoris mirabundus*. A. Anterior portion of body of male, lateral view, with color pattern. B. Foreleg, with color pattern. C. Portion of hind tibia. D. Portion of posterior femur. E. Setae of sternite. F. Outer claw of foreleg. G. Claw of hind leg. H. Setae of under surface of fore tibia. I. Apex of abdomen of male, lateral view. J. Genital region of male, inferoposterior view. K. Inner claw of foreleg. L. Forewing. M. Hind wing. N. Apex of seventh tergite of male. O. Phallus, lateral view. P. Genital region of female, posterodorsal view. Q. Paramere. R–U. *Empicoris whitei*, male. R. Forewing. S. Head and prothorax, dorsal view. T. Base of fore femur. U. Head and prothorax, lateral aspect. V. *Empicoris armatus*, specimen from Jamaica, head and prothorax, lateral view. W. *Empicoris whitei*, phallus, lateral view. X, Y. *Empicoris parshleyi*. X. Foreleg, with color pattern. Y. Spiniform setae of under surface of fore tibia. Z, AA–DD. *Empicoris whitei*, male. Z. Distal half of abdomen, dorsal view. AA. Abdomen, ventral aspect. BB. Base of fore coxa. CC. Portion of hind femur. DD. Apex of abdomen, lateral aspect.

it. The veins closing the apex of the discal cell are generally almost symmetrically formed (fig. 112DD), but in some cases Cu is distinctly bent, as in most other species of *Empicoris*. The apical notch of the forewing is generally rather conspicuous, though occasionally it becomes shallow or disappears completely. The male genital region is as shown in figure 112CC; the phallus is of the usual type for the genus, with the vesica arms about twice as long as the phallotheca.

The above characters are found in all imaginable combinations. The study of isolated extreme specimens would suggest the presence of different taxa. The presence of numerous individuals that are intermediate in various respects shows the fallacy of such a point of view. The above synonymy is the result of these considerations.

MATERIAL EXAMINED: *Canada*: British Columbia, Nanaimo, Biological Station, June 22, 1920 (E. P. Van Duzee; the California Academy of Sciences), one female. *United States*: Texas: San Antonio, October 5, 1942 (E. S. Ross; the California Academy of Sciences), one male; Midland, October 19, 1953, dead in light trap (J. C. Elkins; the American Museum of Natural History), one specimen. Arizona: Mormon Lake, July 8–15, 1956, 7000 feet (F. Werner; University of Arizona), one male; Pinery Canyon, Chiricahua Mountains, July 30, 1957 (G. D. Butler; University of Arizona), one male; Rustlers' Park, Chiricahua Mountains, April 10, 1961, 8400 feet (Wygodzinsky; the American Museum of Natural History), one female. Nevada: Zephyr Point, Lake Tahoe, July 15, 1953 (R. J. Usinger; collection Usinger), one female. California: Monterey County: Bradley, May 17, 1920 (E. P. Van Duzee; the California Academy of Sciences), one female; Monterey County: King City, 9 miles east, March 31, 1959 (C. W. O'Brien; collection Ashlock), two males; Monterey County: Carmel, March 21, 1940 (R. L. Usinger; collection Usinger), one female; Santa Clara County: Los Gatos, August, 1933 (J. A. Kusche; the California Academy of Sciences), three specimens; San Mateo County: San Mateo, September 12, 1920 (E. P. Van Duzee; the California Academy of Sciences), one female; Monterey County: Marina, June 29, 1931 (Van Duzee; the California Academy of Sciences), one specimen; Oakland Hills, 1924 (collection Usinger), one female; Marin County: Muir Woods, April 23, 1911 (E. C. van Dyke; the California Academy of Sciences), one female; Marin County: Lagunitas, March 29, 1908 (E. C. van Dyke; the California Academy of Sciences), one female; Marin County: Mill Valley, September-October (the California Academy of Sciences), one male, one female (the American Museum of Natural History), one male; Lake County: Lower Lake, May 12–14, 1922 (E. P. Van Duzee; the California Academy of Sciences), one male, one female; Shasta County: Hat Creek, July 13, 1955 (Hogue; the American Museum of Natural History), one male. Oregon: Douglas County: 3 miles south of Canyonville, July 24, 1957, *ex Abies grandis* Lindley (J. Lattin; Oregon State University), one male. *Brazil*: Minas Geraes, Carmo do Rio Claro, November, 1947, in birds' nest (J. C. M. Carvalho; Museu Nacional), one female. *Paraguay*: Villarica, September, 1934 (F. Schade; United States National Museum, one female. *Peru:* Callao (United States National Museum), one male. *Guatemala:* Intercepted at San Francisco, on *Oncidium cavendishianum* (United States National Museum), one female. *Argentina:* Tucumán, February, 1950, in spider web under roof of shed (Wygodzinsky; Instituto Miguel Lillo), one male; (Wygodzinsky; the American Museum of Natural History), one female; Jujuy, city, May 10, 1948 (Instituto Miguel Lillo), one male, two females; San Javier, La Paz, Córdoba, January 1–20, 1929 (C. Bruch; Museo Argention de Ciencias Naturales), one female.

DISTRIBUTION: Canada; southern and western United States; Mexico: Guatemala; Peru; Brazil; Paraguay; Argentina.

TYPES: Of *orthoneuron*, male, United States National Museum; of *reticulatus*, male, United States National Museum.

Empicoris pallidulus (Jakovlev)

Ploeariola pallidula JAKOVLEV, 1906a, p. 158.
Empicoris pallidulus: DISPONS AND STICHEL, 1959, p. 97.

To judge from the available data, this species seems to differ considerably from the more typical species of *Empicoris*.

DISTRIBUTION: Turcmenia.
TYPE: Unknown.

Empicoris palmensis Blatchley

Empicoris palmensis BLATCHLEY, 1926, p. 522.

This seems to be a very aberrant species, if it belongs to *Empicoris* at all, and could not be included in the key to American species.
DISTRIBUTION: United States (Florida).
TYPE: Unknown.

Empicoris parshleyi (Bergroth)

Figure 114X, Y

Ploeariola parshleyi BERGROTH, 1922b, p. 79.
Empicoris parshleyi: MCATEE AND MALLOCH, 1925, p. 22.

The foreleg of this species is illustrated (fig. 114X). Some of the spine-like setae of basal portion of the femur are almost as long as the diameter of the segment. The setae of the under surface of the fore tibia (fig. 114Y) are decidedly spinelike.
MATERIAL EXAMINED: United States: Michigan: Emmet County: July 10, 1950 (J. D. Lattin; the American Museum of Natural History), one female.
DISTRIBUTION: Eastern United States.
TYPE: Unknown.

Empicoris pilosus (Fieber)

Ploearia pilosa FIEBER, 1860–1861, p. 149.
Ploiariola vagabunda v. *pilosa:* LETHIERRY AND SEVERIN, 1896, p. 70.
Ploiariodes vagabunda v. *pilosa:* MCATEE AND MALLOCH, 1922, p. 95.
Empicoris vagabundus var. *pilosus:* MCATEE AND MALLOCH, 1925, p. 18.
Ploiariodes hirtipes NATHAN BANKS, 1912, p. 97.
Empicoris pilosus: BLATCHLEY, 1926, p. 523.

The taxonomic rank of *pilosus* cannot be decided definitely before a detailed examination of the male genitalia has been made.
DISTRIBUTION: Netherlands; Belgium; France; Canada; United States.
TYPES: Of *pilosus*, unknown; of *hirtipes*, Boston Society of Natural History.

Empicoris politus (Distant), new combination

Ploiariola polita DISTANT, 1909, p. 502.

The species was figured by Distant (1910).
DISTRIBUTION: Ceylon.
TYPE: British Museum (Natural History).

Empicoris pulcher (Blackburn)

Ploeariodes pulchra BLACKBURN, 1889, p. 350.
Empicoris pulchrus: ZIMMERMAN, 1948, p. 127.

DISTRIBUTION: Hawaiian Islands.
TYPE: Unknown.

Empicoris pyrenaicus Dispons

Empicoris pyrenaicus DISPONS, 1958, p. 83, figs. 1a, 1b.

DISTRIBUTION: France.
TYPE: Unknown.

Empicoris rubromaculatus (Blackburn)

Plate 2, figure 8; plate 4, figures 3, 4; text figures 3A; 6H; 11D, H; 112S–Z, AA, BB

Ploiariodes rubromaculatus BLACKBURN, 1889, p. 349.
Empicoris rubromaculatus: MCATEE AND MALLOCH, 1925, p. 16. fig. 2.
Ploiariola rubromaculata: CHINA, 1938, p. 22.
Empicoris rubromaculatus obsoletus MCATEE AND MALLOCH, 1925, p. 132.
Ploiariodes euryale KIRKALDY, 1908b, p. 372.
Ploiariodes californica NATHAN BANKS, 1909, p. 46.
Ploiariola froggatti HORVÁTH, 1914a, p. 643, fig. 5.
Ploiariola sagax HORVÁTH, 1914a, p. 642, fig. 4 (new synonymy).
Ploiariola scotti DISTANT, 1913, p. 163, pl. 12, fig. 2 (new synonymy).
Empicoris tingitanus DISPONS, 1955, p. 174 (new synonymy).
Empicorella tingitana: DISPONS AND STICHEL, 1959, p. 97, figs. 58–60.
Empicoris microcephalus VILLIERS, 1960e, p. 28, fig. 16 (new synonymy).

The variability of this species is partly demonstrated in table 5. The presence or absence of a red spot on the apex of the pterostigma, on which McAtee and Malloch's *obsoletus* was based, is not considered as of taxonomic significance.

A few of the characters of *rubromaculatus* are illustrated. The fore femur is very long and slender and bears on its ventral surface a relatively large number of short, subequal spines (fig. 112S). The tarsus and claws of this species are like those of the other species of *Empicoris*. The setae of the mid and hind femora and tibiae are distinctly of two different sizes (fig. 112U, V). The deep apical incision of the pygophore (fig. 112Z) is shared by *minutus*, but other species of *Empicoris*

possess also an apically emarginated pygophore process, for instance, *discalis*. The phallus is characterized by its extremely short vesica arms (fig. 112X), but whether or not this feature is unique in the genus cannot be decided before the phalli of more species have been examined.

The type specimens of *froggatti* and *sagax* have been examined in the course of the present work; they were found to agree perfectly with *rubromaculatus*.

China (1930) had already considered the possibility that the Seychellan *Ploiariola scotti* described by Distant (1913) was identical with *rubromaculatus*. Usinger (personal communication) agrees with China's suggestion. The synonymy is formally established here.

The species originally described as *Empicoris tingitanus*, to judge from the careful redescription (as *Empicorella tingitana*) by Dispons and Stichel (1959), is identical with *E. rubromaculatus*. Dispons (1955) mentioned the fact that his species is characterized by "son pronotum que porte une carène latérale incomplête réduite à un bourrelet de couleur ivoire, très court, épais, n'occupant que la partie antérieure du lobe postérieur du pronotum." This condition corresponds exactly to that found in *rubromaculatus* (fig. 112T). Dispons' (*loc. cit.*) information that in the latter species "la carène latérale du pronotum est également incomplète, mais indistincte dans sa partie médiane, brun dans sa partie antérieure et blanche dans sa partie postérieure" is incorrect.

The description of *Empicoris microcephalus* Villiers is easily applicable to *rubromaculatus*, and, as the latter species occurs in Madagascar from whence *microcephalus* was described, I synonymize *microcephalus* with *rubromaculatus*.

MATERIAL EXAMINED: *Australia*: South Australia, Kangaroo Island (A. M. Lea; South Australian Museum), one specimen; South Australia, Karoonda to Peebinga (G. E. H. Wright; South Australian Museum), one specimen; South Australia, Lucindale (A. M. Lea; South Australian Museum), one specimen; Tasmania, Hobart (Lea; South Australian Museum), one specimen; Sydney (Lea; South Australian Museum), one specimen. *New Guinea:* Hollandia, West New Guinea, August 24, 1955, 100 meters (J. L. Gressitt; Bernice P. Bishop Museum), one female. *Moluccas:* Larat (F. Muir; the California Academy of Sciences), one male. *New Caledonia:* Forêt de Thi, March 31, 1958 (J. Rageau; Institut Français d'Océanie), one female. *Japan:* Honshu: Moji, September 11, 1906 (the American Museum of Natural History), one male. *Macao:* Macao, October, 1906 (F. Muir; the California Academy of Sciences), one male. *Mauritius*: Rose Hill, March 2, 1951 [Ray Mamet; British Museum (Natural History)]. *Madagascar*: Tananarive (Olsufiev; Zoological Institute of the Academy of Sciences, Leningrad), six specimens. *Angola:* Dundo, July 7, 1947, at light (A. B. Machado; Museo do Dundo), one specimen; Malanga, September 11, 1949 (B. Malkin; the California Academy of Sciences), one female. *Argentina*: Marcos Paz, Tucumán, August 16, 1954 (Monrós; the American Museum of Natural History), one female. *Cuba*: Isle of Pines, July 31, 1921 (the American Museum of Natural History), one male. *United States*: California: Marin County: Inverness, August-December, 1961, at light (C. A. Toschi; the American Museum of Natural History), several males and females; California: Mendocino County: Mendocino, September 22, 1958 (J. R. Helfer; the California Academy of Sciences), one male. *Portugal*: Lisbon, near Botanical Garden, July, 1964 (A. M. Nadler; the American Museum of Natural History), one female.

DISTRIBUTION: Portugal; northern, equatorial, and South Africa; Madeira; western United States; Jamaica; Puerto Rico; Cuba; Venezuela; Brazil; Chile; Argentina; Uruguay; Juan Fernández; Australia and Tasmania; Lord Howe Island; Fiji; Samoa; New Caledonia; Hawaiian Islands; Philippines; Japan; Macao; India; Seychelles; Mauritius; Madagascar.

TYPES: Of *rubromaculatus*, unknown; of *euryale*, male, Bernice P. Bishop Museum; of *froggatti*, Bernice P. Bishop Museum; of *sagax*, Bernice P. Bishop Museum; of *scotti*, British Museum (Natural History); of *tingitanus*, unknown; of *microcephalus*, male, Muséum National d'Histoire Naturelle.

Empicoris salinus (Lindberg)

Ploiariola salina LINDBERG, 1932, p. 46.
Empicoris salinus: DISPONS, 1955, p. 173.

DISTRIBUTION: Morocco; Canaries; France.
TYPE: Museum Zoologicum Universitatis.

Empicoris seorsus (Bergroth)

Ploiariodes seorsus BERGROTH, 1926, p. 678.
Empicoris seorsus: MYERS AND CHINA, 1928, p. 382.

DISTRIBUTION: New Zealand.
TYPE: Unknown.

Empicoris soror (Puton)

Ploiariola soror PUTON, 1887, p. 101.
Empicoris soror: PRIESNER AND ALFIERI, 1953, p. 69.

Dispons and Stichel (1959) partially illustrated the species.
DISTRIBUTION: Tunisia; Egypt.
TYPE: Unknown.

Empicoris stevensoni Miller

Empicoris stevensoni MILLER, 1950, p. 190, figs. 2a–2c.

DISTRIBUTION: Southern Rhodesia.
TYPE: Male, British Museum (Natural History).

Empicoris subparallelus McAtee and Malloch

Empicoris subparallelus MCATEE AND MALLOCH, 1925, p. 21.

DISTRIBUTION: United States (Texas); Cuba.
TYPE: Male, United States National Museum.

Empicoris tesselatoides Wygodzinsky and Usinger

Empicoris tesselatus MCATEE AND MALLOCH, 1926, p. 131 (preoccupied by *Ploeariola* (=*Empicoris*) *tesselata* Bergroth, 1914a).
Empicoris tesselatoides WYGODZINSKY AND USINGER, 1960, p. 267.

DISTRIBUTION: Singapore; Mariana Islands.
TYPE: Female, United States National Museum.

Empicoris tesselatus (Bergroth)

Ploeariola tesselata BERGROTH, 1914a, p. 8.
Empicoris tesselatus: VILLIERS, 1949a, p. 283.

DISTRIBUTION: Natal.
TYPE: Female, Naturhistoriska Museet, Göteborg.

Empicoris thermalis Dispons

Empicoris thermalis DISPONS, 1958, p. 84, figs. 2a, 2b.

DISTRIBUTION: France.
TYPE: Unknown.

Empicoris trisignatus Dispons

Empicoris trisignatus DISPONS, 1955, p. 174.

The original description is contained in a short footnote. More details and one illustration were given by Dispons and Stichel (1959).
Distribution: Morocco.
TYPE: Unknown.

Empicoris truncatus Dispons

Empicoris truncatus DISPONS, 1955, p. 174.

Also for this species, a better description than the original one is found in Dispons and Stichel (1959), accompanied by an illustration.
DISTRIBUTION: Algeria.
TYPE: Unknown.

Empicoris uniannulatus (Signoret)

Ploiaria uniannulata SIGNORET, 1852, p. 544, pl. 16, fig. 5.
Ploiariola uniannulata: LETHIERRY AND SEVERIN, 1896, p. 70.
Empicoris uniannulatus: DISPONS AND STICHEL, 1959, p. 97.

Dohrn (1863) considered such characters as the proportions of the antennal segments, the aberrant shape of the pronotum, abbreviated forewings, and strongly widened abdomen as indicative of the possibility that *uniannulatus* does not belong in the present genus. A reexamination of this species is highly desirable.
DISTRIBUTION: France.
TYPE: Unknown.

Empicoris vagabundus (Linné)

Figures 5K; 115A-X

Cimex vagabundus LINNÉ, 1758, p. 450.
Gerris vagabundus: FABRICIUS, 1794, p. 192.
Ploiaria vagabundus: LATREILLE, 1802, p. 249.

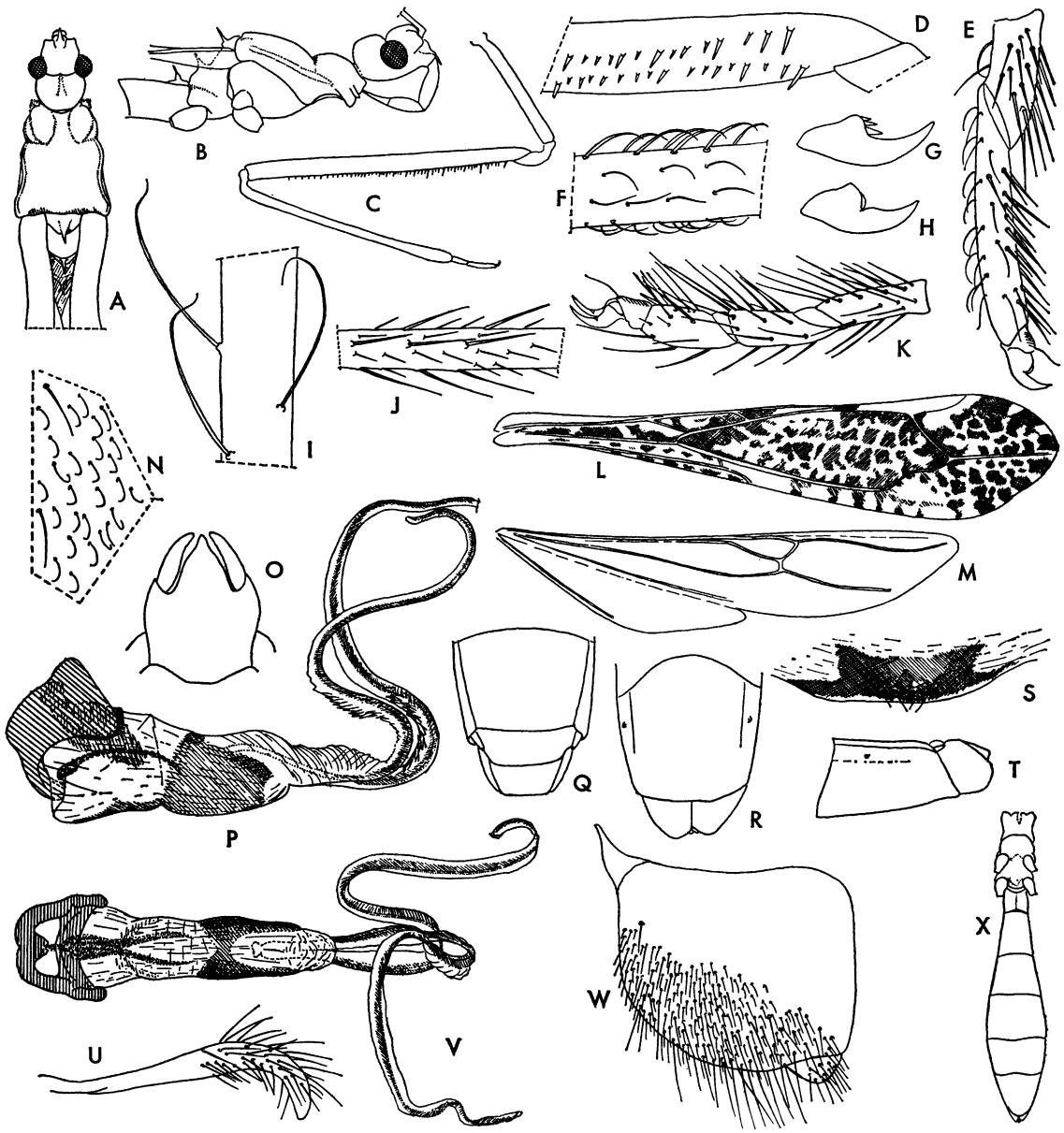


FIG. 115. *Empicoris vagabundus*. A. Anterior portion of body, dorsal view. B. Anterior portion of body, side view. C. Foreleg. D. Base of fore femur. E. Fore tarsus. F. Portion of center of fore tibia. G, H. Claws of foreleg. I. Portion of hind femur. J. Portion of posterior tibia. K. Posterior tarsus. L. Forewing, with color pattern. M. Hind wing. N. Setae of sternite. O. Pygophore, inferoposterior view. P. Phallus, lateral aspect. Q. Apex of abdomen of female, dorsal view. R. Apex of abdomen of female, ventral aspect. S. Syngonapophysis. T. Distal portion of abdomen of female, side view. U. Paramere. V. Phallus, dorsal aspect. W. Gonocoxite with syngonapophysis. X. Thorax and abdomen of female, ventral aspect.

Ploiariola vagabunda: REUTER, 1888, p. 711.
[*Empicoris*] *vagabundus:* WOLFF, 1811, p. 5.
Empicoris vagabundus var. *vagabundus:* McATEE AND MALLOCH, 1923, p. 163.
Cimex squalidus GMELIN, 1788, p. 683.
Ploearia erratica SAHLBERG, 1848, p. 149.
Ploiariola canadensis PARSHLEY, 1919, p. 25.

This is the type species of *Empicoris*. It was thought advisable to illustrate it fully here; the illustrations are self-explanatory.

A detailed synonymy for the older literature was given by Reuter (1888).

The species, widely dispersed in Europe, is apparently rare in North America; it has been reported from British Columbia and Washington, D. C. The specimen mentioned below represents the second record for the United States.

MATERIAL EXAMINED: United States: Washington: Chaparral Creek, Mt. Adams Primitive Area, September 2, 1954, 2500 feet (B. Malkin; the California Academy of Sciences), one female.

DISTRIBUTION: Europe (from Scandinavia to the Mediterranean, from England to southern Russia); Siberia; Canada (British Columbia); United States.

TYPES: It has not been possible to obtain information on the locations of the type specimens corresponding to the various names above.

Empicoris vitticollis (Horváth)

Ploiariola vitticollis HORVÁTH, 1914b, p. 88.
Empicoris vitticollis: DISPONS, 1955, p. 173.

DISTRIBUTION: France; Cape Verde Islands; Azores.

TYPE: Muséum National d'Histoire Naturelle.

Empicoris whitei (Blackburn)

Figure 114R–U, W, Z, AA–DD

Ploiariodes whitei BLACKBURN, 1881, p. 59.
Empicoris whitei: VAN DUZEE, 1936, p. 226.

This is the type of *Ploiariodes*. Zimmerman (1948) furnished a good figure of the general aspect of the species. The illustrations presented in the present paper are intended to contribute further to the knowledge of the species. The lateral carina of the pronotum is not sharp as in the other species of the genus, but still perceptible (fig. 114U). The woollike pile of the head and pronotum is extremely dense and gives the species a superficial similarity to species of *Emesopsis*. A surprising feature is the presence of distinctive though slender, spinelike setae on the anterodorsal surface of the fore coxae, a plesiomorphic feature unique in the genus (fig. 114BB). The phallus (fig. 114W) lacks peculiar features. The tarsus of the forelegs is two-segmented, as in all other *Empicoris*, and not three-segmented as indicated in the generic description of *Ploiariodes* by White (1881).

DISTRIBUTION: Hawaiian Islands.

TYPE: Unknown.

Empicoris winnemana McAtee and Malloch

Figure 113T, U

Empicoris winnemana McATEE AND MALLOCH, 1925, p. 19, figs. 6, 7.

The unique fore and hind wings are illustrated.

MATERIAL EXAMINED: United States: Connecticut: Storrs, September 1, 1955 (P. D. Ashlock; the American Museum of Natural History), one female.

DISTRIBUTION: Eastern United States.

TYPE: Male, United States National Museum.

Empicoris xambeui (Montandon), new combination

Figure 113S

Ploiaria xambeui MONTANDON, 1885, p. 113.
Ploiariola xambeui: LETHIERRY AND SEVERIN, 1896, p. 70.
Corempis xambeui: DISPONS AND STICHEL, 1959, p. 85.

Dispons and Stichel (1959) indicated that *xambeui* has the "Vorderfemur vollständig kahl und ohne Dornen," a character that, if true, would be unique in the subfamily. A specimen from Corsica, which I have examined, possesses distinct spines on the fore femur. They are very small and are difficult to observe unless a slide mount is made (fig. 113S).

DISTRIBUTION: France; Italy; Yugoslavia.

TYPE: Museum of Natural History, Bucharest.

HYBOMATOCORIS, NEW GENUS

DESCRIPTION: Macropterous. Small species (4 mm.)

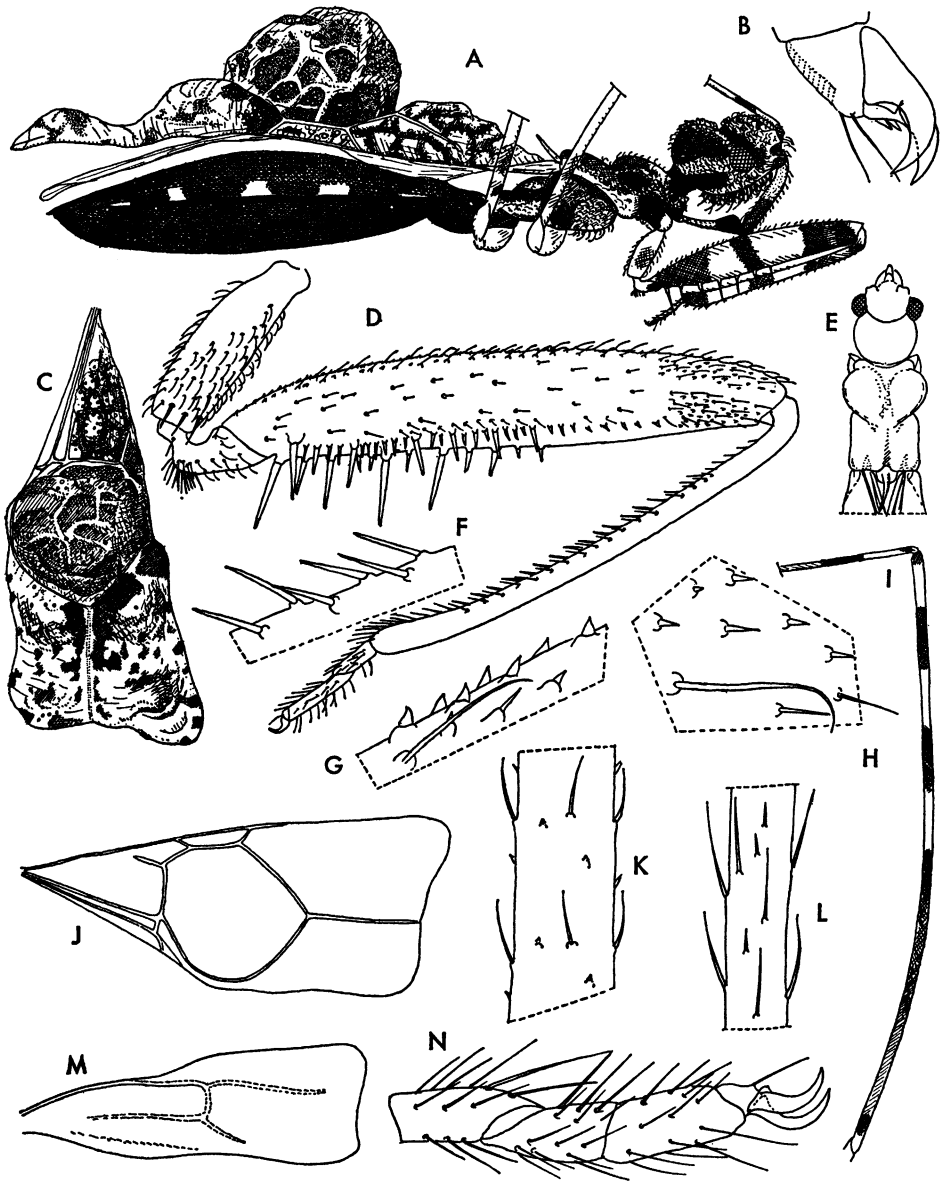


FIG. 116. *Hybomatocoris penai*, male. A. General aspect, lateral view, with color pattern. B. Praetarsus and claws of foreleg. C. Forewing, seen from above. D. Foreleg. E. Head and thorax, seen from above. F. Spiniform setae of under surface of fore tibia. G. Detail of dorsal surface of base of fore femur. H. Setae of dorsal surface of apex of fore femur. I. Femur and base of tibia of hind leg, with color pattern. J. Forewing, scheme of venation. K. Portion of posterior femur. L. Portion of posterior tibia. M. Hind wing. N. Posterior tarsus.

Body surface mostly dull, some regions shining, with short and isolated long hairs and with short, adpressed, wool-like pile on head and thorax. Basic color white, body and appendages with striking dark pattern elements.

Head short; anteocular portion much shorter than postocular, latter rounded behind in dorsal and lateral view; both distinctly elevated above. Eyes small. Rostrum conspicuously bent between first and second segments; first elongate, parallel-sided, surpassing level of posterior border of eyes; second less than half as long as first, strongly swollen; third slender, shorter than first. Antennae inserted at anterior border of head; both sexes with very short setae only. Interocular furrow arising behind level of center of eyes, curving backward to behind level of posterior border of eyes.

Pronotum completely covering mesonotum. Fore lobe slightly longer than hind lobe, its sides rounded, its disc with a deep, median, longitudinal impression, convex at both sides of impression; lateral carinae lacking. Hind lobe shorter than wide, subrectangular, its disc not strongly elevated. Scutellum with a long, metanotum with a short, spine; basal abdominal tergite lacking projection or spine.

Forelegs stout. Coxa very short. Trochanter simple. Femur with two series of spines inserted on short basal processes. Posteroventral series beginning at base of article, consisting of several long and short spines, some of former about as long as diameter of segment. Anteroventral series beginning almost at level of base of posteroventral series, not interrupted at base, composed of one basal large spine and several medium-sized and short spines. Tibia six-sevenths as long as femur, slender, its under surface with two rows of strong, inclined setae. Tarsus two-segmented; basal segment about half as long as apical one. Tarsus about one-fourth as long as tibia. Segments not strongly sclerotized, hairy on all surfaces. Claws subequal in size, inner one with a medially incised ventral lamella, outer one with two small, pointed, subbasal projections. Mid and hind legs rather short, posterior femora hardly surpassing apex of forewings. Femora and tibia with sparse short hairs, those of tibia intermixed with very short setae. Claws slender, curved, simple in structure.

Forewings truncate apically, heavily wrinkled, irregularly carinate, conspicuously bullate in various regions. Discal cell large, as long as wide, truncate basally, obtuse-angled apically. M and Cu widely separated basad of cell, Cu attaining wing base, M short, free. Pcu meeting discal cell at level of base of latter. Outer border of cell connected to costal margin of wing by one subbasal and one subapical oblique cross vein. Pterostigma extremely narrow, its apex remote from wing tip. Hind wings reduced, lacking anal lobe and hamus, their apex truncate-emarginate; only two simple longitudinal veins basad and apicad of cross vein. Surface of hind wings wrinkled.

Abdomen compressed dorsoventrally, elliptical, one and a half times as long as maximum width, in both sexes. Segmental limits poorly developed between third and fourth as well as between fifth, sixth, and seventh segments. Posterior border of basal abdominal sternite straight.

Male: Seventh tergite projecting considerably beyond apex of genital segments. Eighth sternite short, partly hidden by VII. Pygophore occupying one-sixth of total length of abdomen, subterminal, shorter than wide, compressed dorsoventrally, its posterior border with a short projection. Parameres short, clavate, with simple setae. Articulatory apparatus short. Struts poorly developed, short, divergent at extreme base, fused at apex. Phallobase subcylindrical, membranous, with an extensive, irregularly ring-shaped sclerotization. Base of vesica arms dorsally with one median and 1+1 lateral short projections; arms subcylindrical, narrowly pointed at apex.

Female: Eighth and ninth tergites partly fused, subhorizontal, combined wider than long. Seventh sternite salient in middle, covering gonocoxites laterally and ventrally for their greater part. Gonocoxites longer than wide; gonapophyses small, but with numerous setae. Syngonapophysis transverse, poorly sclerotized, with a few setae.

TYPE SPECIES: *Hybomatocoris penai*, new species.

ETYMOLOGY: *Hyboma-*, *tos*, hump, and *coris*, bug.

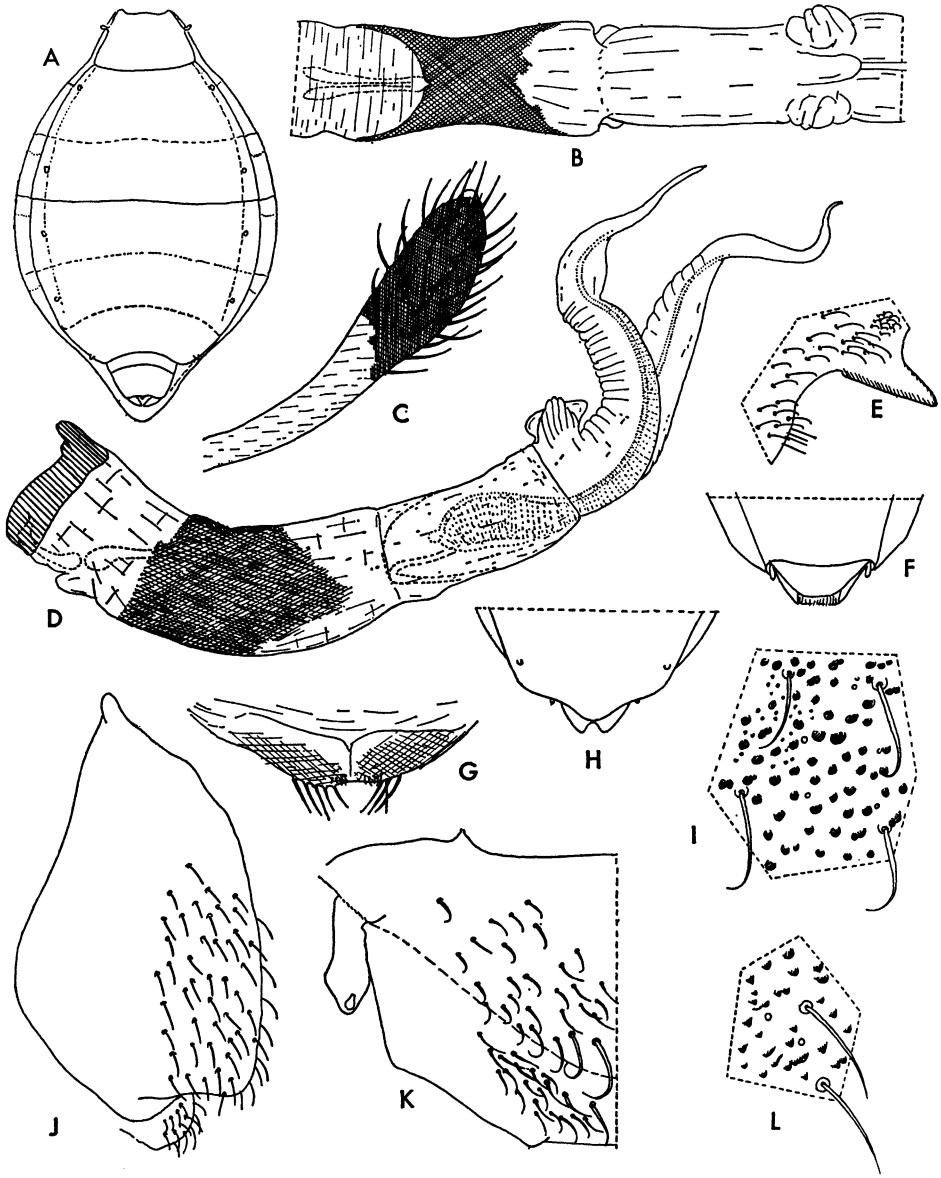


FIG. 117. *Hybomatocoris penai*. A. Abdomen of male, ventral aspect. B. Phallotheca and conjunctiva, dorsal view. C. Paramere. D. Phallus, lateral aspect. E. Apex of pygophore, lateral view, high magnification. F. Genital region of female, dorsal view. G. Syngonapophysis. H. Genital region of female, ventral aspect. I. Detail of surface of abdominal sternite. J. Gonocoxite with gonapophysis. K. Left half of eighth and ninth tergites of female, as seen on slide mount. L. Detail of surface of gonocoxite.

DISTRIBUTION: Central Chile.

OBSERVATIONS: This extraordinary new genus seems to be related to *Mesosepis* and *Bironiola*. It differs from both by the short fore coxae, the fact that the discal cell of the forewing does not touch Sc at any point, the very wide abdomen, and other characters.

Hybomatocoris penai, new species

Figures 116A–N; 117-A–L

DESCRIPTION: Male and female: Length, 3.8–3.9 mm.

General color whitish, dark pattern elements piceous to black. Head dark, somewhat lighter above insertion of rostrum. First rostral segment dark on apical half, second completely dark, third light-colored. First antennal segment fulvous, two subbasal annuli whitish, one wide subapical annulus piceous; remaining segments uniformly fulvous. Anterior portion of prothorax piceous with exception of upper portion of acetabula; hind lobe of pronotum whitish, dark anteriorly at sides and along 1+1 submedian stripes on disc. Scutellar spine and metanotal process whitish. Color pattern of forelegs as shown in figure 116A. Coxae and trochantera of mid and hind legs fulvous; femora fulvous at base, remainder whitish, with three wide annuli piceous, extreme apex also darkened (fig. 116I); tibiae fulvous, their extreme base and one wide subbasal annulus dark. Fore wings grayish white, variegated and blotched with black. Hind wings whitish hyaline, veins faintly darkened, especially cross vein. Disc faintly clouded with darker, especially on basal half of wing. Abdomen piceous; spiracles and connexival spots flavous.

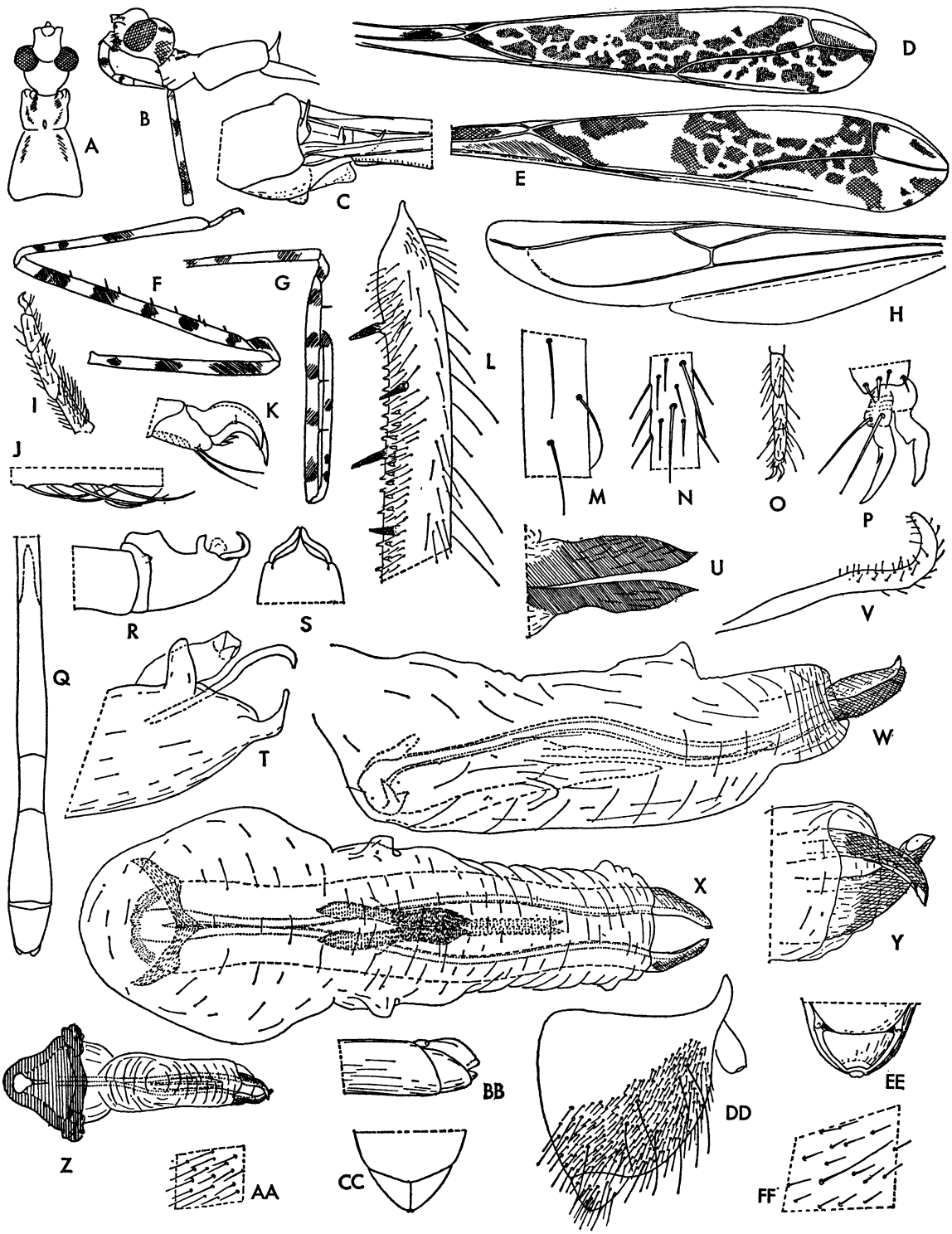
Body surface dull; rostrum and legs shining. Head, fore lobe of pronotum, and thorax laterally and ventrally with extensive areas of adpressed, whitish, wool-like pile, under surface of head furthermore with numerous long curved hairs. Several body parts in addition to ordinary setae with numerous minute spiculets especially on legs (fig. 116G, H) and abdomen (fig. 117I, L).

Head and rostrum as given in generic description and shown in figure 116A, E. Eyes very small; interocular distance dorsally equal to three times their width; in lateral view remote from level of ventral and dorsal surface of head. Length of first antennal segment, 2 mm.; relative length of segments, 1/0.6/0.31/0.21.

Thorax as given in generic description and shown in figure 116A, E. Fore lobe of pronotum wider than hind lobe, its sides rounded, converging posteriorly; its surface minutely reticulate, shining; wool-like pile along median longitudinal depression and fore and lateral borders. Hind lobe irregularly rugose, slightly shining, with a median longitudinal carina, humeral angles slightly elevated, posterior border with a conspicuous central emargination. Upper portion of anterior acetabula projecting, rounded apically. Spine of scutellum long, pointed, obliquely inclined posteriorly. Metanotal process short.

Forelegs as given in generic description and shown in figure 116B, D, F–H. Coxa as long as anterior portion of prothorax, in lateral view, and only slightly over twice as long as wide. Trochanter at basal ventral angle with a conspicuous group of short setae. Femur five to six times as long as maximum width. Posteroventral series composed of five to six long, and approximately 10 medium-sized, spines, series terminating shortly beyond middle of segment. Anteroventral series composed of one large basal spine, six to seven medium-sized spines, and approximately 30 small to very small spines, attaining apex of segment. Femora of mid and hind legs somewhat curved on basal half; posterior femora surpassing apex of forewings by 0.6 mm. Setae of femora sparse, uniform in size, accompanied by scattered pointed spiculae (fig. 116G, H); setae of tibiae similar, spiculae substituted by very short bristles. Tarsal segments subequal in size, their chaetotaxy and shape of claws as shown in figure 116B, D. Chaetotaxy of mid and hind femora and tibiae and structure of posterior tarsus as given in generic description and shown in figure 116K, L, N.

Forewings as given in generic description and shown in figure 116A, C, J, attaining or slightly surpassing apex of abdomen. Surface of discal cell very strongly bullate; area between Cu and R+M on basal portion of wing, as well as two areas on each side of apical vein on distal portion of wing, conspicuously embossed. Wing surface irregularly wrinkled, peppered with irregularly distributed, minute, circular areolae, absent from


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF

apical portion of wing. Discal cell and area between R+M and Cu on basal portion of wing carinate, forming cell-like structures. Surface of hind wing wrinkled; its venation as shown in figure 116M; areolae few in number, present mainly on basal half of wing.

Abdomen as given in generic description and shown in figure 117A. Sternites and tergites with sparse setae of uniform size and numerous small blunt or pointed cuticular processes (fig. 117I, L).

Genitalia of male and female as given in generic description and shown in figure 117A–H, J–L.

MATERIAL EXAMINED: Chile: Cerro San Ramón, Santiago, October, 1953 (L. E. Peña; collection Peña), one male holotype, one female allotype; (L. E. Peña; the American Museum of Natural History), one male; El Manzano, Santiago, June 2, 1951, 700 meters (Kuschel; Universidad de Chile), one incomplete female.

OBSERVATION: This species is named for the Chilean entomologist L. E. Peña.

MALACOPUS STÅL

Malacopus STÅL, 1860, p. 80.

DESCRIPTION: Macropterous. Small species (6–7 mm.).

Body surface partly dull, partly shining, with short and long hairs, but lacking wool-like pile. Basic color whitish, legs and antennae annulated with dark, head and thorax with generally faint, forewings with conspicuous, pattern elements, those on forewings forming simple spots.

Head short, anteocular and postocular portions of identical length, strongly elevated dorsally. Anteocular with sides parallel in dorsal view; postocular subsemiglobular in dorsal and lateral views. Eyes large. Rostrum conspicuously bent between first and second segments; first stout, subvertical in position; second somewhat shorter and more slender than first, third not or only slightly longer than second. Antenniferous tubercles large; antennae inserted near level of anterior margin of head; first segment of antennae of male and female with or without long hairs. Interocular furrow situated at about level of center of eyes. Dorsal surface of head with numerous isolated long hairs.

Pronotum completely covering mesonotum, distinctly constricted before middle; lacking lateral carinae. Anterior lobe wider than long, its side subparallel to rounded; disc posteriorly at center with a punctiform or oval depression; surface smooth, slightly shining. Posterior lobe as long as, or longer than, wide, distinctly widened posteriorly; surface coarsely punctate. Scutellum, metanotum, and first abdominal segment each with a slender spine posteriorly; surface coarsely punctate. Scutellum, metanotum, and first abdominal tergite each with a slender spine, metanotum with a median longitudinal ridge. Pronotum and scutellum with isolated long hairs.

Forelegs slender. Coxa and trochanter simple. Femur with two series of processes. Posteroventral series beginning near but not at base of article, composed of four relatively large spines inserted on short, wartlike bases and very numerous short denticles; large processes combined with their bases almost as long as diameter of segment. Anteroventral series beginning somewhat distad of posteroventral series, not interrupted at base, similar

---

FIG. 118 (OPPOSITE PAGE). A–C. *Malacopus banksi*. A. Head and prothorax, dorsal view. B. Anterior portion of body, lateral view, with color pattern. C. Thorax and base of abdomen, dorsolateral view. D. *Malacopus schubarti*, forewing, with color pattern. E. *Malacopus banksi*, forewing, with color pattern. F. *Malacopus schubarti*, foreleg, with color pattern. G–Z, AA–FF. *Malacopus banksi*. G. Foreleg, with color pattern. H. Hind wing. I. Fore tarsus. J. Setae of under surface of fore tibia. K. Praetarsus and claws of foreleg. L. Base of fore femur. M. Portion of posterior femur. N. Portion of hind tibia. O. Posterior tarsus. P. Apex of hind tibia, with praetarsus and claws. Q. Abdomen of male, ventral aspect. R. Apex of abdomen of male, side view. S. Apex of pygophore, seen from behind. T. Apical portion of pygophore, lateral view. U. Sclerites of endosoma. V. Paramere. W. Phallotheca, lateral view. X. Phallus, seen from below. Y. Apex of phallotheca with apices of vesica arms. Z. Phallus, seen from above. AA. Setae of pygophore. BB. Apex of abdomen of female, side view. CC. Genital region of female, seen from below. DD. Gonocoxite and gonapophysis. EE. Genital region of female, seen from behind. FF. Setae of sternite of female.

in composition to latter series. Fore tibia slender, four-fifths as long as femur; ventrally with two series of strong, curved, deflected setae. Fore tarsus one-sixth as long as tibia, three-segmented, not heavily chitinized, hairy on all surfaces, bristles of ventral surface stiff, especially on basal segment. First and second segments subequal in length, third slightly shorter. Claws of identical size, inner one with a reduced, medially incised, ventral lamella, outer one with two small, pointed, subbasal projections. Mid and hind legs slender, posterior femora distinctly surpassing apex of abdomen. Femora with isolated long hairs; tibiae with microchaetae and isolated macrochaetae. Tarsal segments subequal in length, their setae simple. Claws slender, not strongly curved; one with a submedian incision, other with a slender, pointed projection ventrally at middle.

Surface of forewings smooth. Discal cell large, truncate apically, pointed at base; M and Cu completely fused basad of cell. Short vein connecting base of cell to costal margin present. Pterostigma carried to apex of wing. Hind wing with veins complete; Cu joining R+M subapically.

Abdomen elongate, very narrow at base in lateral and ventral aspect, distinctly widened posteriorly, widest at seventh segment. Apparent hind margin of first abdominal sternite deeply incised. Surface of abdomen shining, covered with numerous microchaetae and isolated macrochaetae.

Male: Seventh tergite short, not projecting over genitalia. Eighth sternite visible on its whole length, narrowly band-shaped in lateral view. Pygophore small, not occupying more than one-eighth of total abdominal length, about as long as high in lateral view, its apparent dorsal border at sides frequently with 1+1 more or less developed projections, sclerotized dorsally on basal half only, apical half of dorsal surface membranous. Process of posterosuperior border well developed, pointed or rounded apically. Parameres long and slender, straight on basal half, sickle-shaped apically, beset with short bristles. Articulatory apparatus subtriangular. Phallotheca membranous, with a few very short projections, and rarely small, somewhat more sclerotized regions. Endosoma with two pairs of slender, elongate, rodlike sclerites. Apical free portions of vesica and seminal ducts short, tubular, membranous or slightly sclerotized.

Female: Eighth and ninth tergites fused, somewhat hood-shaped, subsemicircular to subtrapezoidal in posterior view. Gonocoxites large. Syngonapophysis not sclerotized.

TYPE SPECIES: *Malacopus cellularis* Stål (monobasic).

DISTRIBUTION: Neotropical Region.

OBSERVATIONS: All species included here form a closely knit group. The following key must be used with caution, and in all cases descriptions or identified specimens must be consulted for one to arrive at correct determinations.

KEY TO THE SPECIES OF *Malacopus*

1. Spots of discal cell of forewing forming a continuous, irregularly shaped, longitudinal band (fig. 118D) 2
   Spots of forewing divided into a distal, roughly hourglass-shaped group of numerous smaller spots, and one or two large spots situated in basal angle of cell, separated from apical group by a distinct gap (fig. 118E) . . . 3
2. Apex of fore tibiae dark (as shown in fig. 118G); mid and hind tibiae with a single subbasal dark annulus; fore femur about 15 times as long as wide . . . . . *zeteki*
   Apex of fore tibiae not darkened (fig. 118F); mid and hind tibiae subbasally with two dark annuli; fore femur about 20 times as long as wide . . . . . *schubarti*
3. Fore femur with four dark annuli . . . . . *cellularis*
   Four femur with five dark annuli 4
4. Base of discal cell of forewing with a single, large, posteriorly pointed spot; spots of apical region loosely grouped; posterior process of pygophore of male rounded apically . . . . . *romani*
   Base of discal cell with two irregularly shaped, longitudinal spots; apical group of spots very compact (fig. 118E); posterior process of pygophore pointed apically (fig. 118S) . . . . . *banksi*

Malacopus banksi Wygodzinsky

Figures 13M; 118A–C, E, G–Z, AA–FF

Malacopus banksi WYGODZINSKY, 1950c, p. 249, figs. 56–60.

The external morphology of this species is here illustrated in detail. The well-developed spermatheca of the female is shown in figure 13M.

MATERIAL EXAMINED: Cuba: Soledad, March 6, 1925 (J. G. Myers; United States National Museum), two males, two females; (J. G. Myers; the American Museum of Natural History), one male.

DISTRIBUTION: Cuba.

TYPE: Male, Museum of Comparative Zoölogy.

Malacopus cellularis Stål

Malacopus cellularis STÅL, 1860, p. 81.

Wygodzinsky (1947c) illustrated the species in detail.

DISTRIBUTION: Brazil.

TYPE: Female, Naturhistoriska Riksmuseet.

Malacopus romani Wygodzinsky

Malacopus romani WYGODZINSKY, 1947c, p. 466, figs. 19–29.

DISTRIBUTION: Brazil.

TYPE: Male, Naturhistoriska Riksmuseet.

Malacopus schubarti Wygodzinsky

Figure 118D, F

Malacopus schubarti WYGODZINSKY, 1950c, p. 248, figs. 48–55.

DISTRIBUTION: Brazil.

TYPE: Male, Instituto Oswaldo Cruz.

Malacopus zeteki Wygodzinsky

Malacopus zeteki WYGODZINSKY, 1947c, p. 463, figs. 11–19.

DISTRIBUTION: Panama.

TYPE: Female, United States National Museum.

MESOSEPIS, NEW GENUS

DESCRIPTION: Macropterous. Small species (5–6 mm.).

Body surface partly dull, partly shining, with short and long hairs, and with short, adpressed, wool-like pile on parts of head, thorax, and basal abdominal segment. Basic color white to stramineous; body and appendages, including hind wings, with conspicuous dark pattern elements.

Head short; anteocular portion much shorter than postocular, latter rounded behind in dorsal and lateral views; both moderately elevated above. Eyes large. Rostrum conspicuously bent between first and second segments; first slender; second subcylindrical, slightly less than half as long as first; third longer than second. Antennae inserted at anterior border of head. First segment of antennae with long hairs in both sexes. Interocular furrow situated at level of center of eyes, somewhat backwardly curved, but not attaining level of posterior border of eyes.

Pronotum completely covering mesonotum, distinctly constricted before middle. Fore lobe wider than long, with a punctiform depression posteriorly at center of disc. Hind lobe approximately as long as wide, sides slightly diverging posteriorly. Scutellum lacking spine; metanotum with a short apical spine. First abdominal tergite somewhat elevated at center, but lacking spine.

Forelegs stout. Coxa and trochanter simple. Femur with two series of processes. Posteroventral series beginning near but not at base of article, composed of three to five larger and numerous smaller spines inserted on short or extremely short bases; large spines combined with their bases much shorter than diameter of segment. Anteroventral beginning somewhat distad of posteroventral series, not interrupted at base, similar in structure to posteroventral series, but spines shorter. Tibia three-fourths as long as femur, ventrally with two series of strong, curved setae. Tarsi indistinctly three-segmented, one-fifth as long as tibia, not strongly chitinized, hairy on all surfaces. Claws subequal in size, inner one with a medially incised, ventral lamella, outer one with two small, pointed, subbasal processes. Mid and hind legs rather short, hind femora slightly surpassing apex of body or forewings. Femora of mid and hind legs with setae of one type only. Claws slender, faintly curved, with a very low, medially incised, ventral lamella.

Surface of forewings smooth. Discal cell large, truncate apically and basally; its basal external angle connected to costal margin of wing by a short vein. M and Cu separate basad of cell; M short, free, Cu attaining axillary region. Portion of Cu along discal cell S-shaped. Pterostigma very narrow, remote from wing tip. Hind wings with normal venation.

Abdomen rather short; narrowed and conspicuously constricted shortly beyond base, widest on posterior third. Hind border of basal sternite deeply incised.

Male: Seventh tergite short, not projecting much beyond base of genital segments. Eighth sternite well developed, its spiracle not projecting. Pygophore occupying about one-fifth of total length of abdomen, about as long as high in lateral view. Posterior process spinelike. Parameres short, somewhat bent apically, with simple setae. Articulatory apparatus short, its arms wide at base, narrow on remaining extension. Basal plate struts fused on entire length, forming rodlike sclerite adhering to dorsal wall of phallotheca. Latter short, irregularly subcylindrical, entirely membranous, lacking projections. Vesica arms relatively short, tubular, simple in structure, narrowed at apex.

Female: Eighth and ninth tergites small, limited to dorsal surface only. Remainder not examined.

TYPE SPECIES: *Mesosepis papua*, new species.

ETYMOLOGY: Anagram of *Emesopsis*, a genus of the Emesinae.

DISTRIBUTION: Oriental and Australian regions.

OBSERVATIONS: The type species is from New Guinea. A second species, from Australia, is not described.

Mesosepis is possibly related to the more specialized *Sepimesos* described in this paper; it differs by the characters indicated in the key.

Mesosepis papua, new species

Figure 119A–R

DESCRIPTION: Male and female: Length to apex of forewings, 4.9 mm. in male; 5.7 mm. in female.

Head piceous, densely covered with short white pile with exception of region immediately anterior to interocular furrow, an anteriorly branched median line on fore lobe of head dorsally and at insertion of rostrum. Rostrum stramineous, first or, in some cases also second, segment indistinctly spotted with darker. Antennae stramineous; first segment narrowly darkened at base and apex, with one to three faint, narrow, dark annuli along its extension; second segment with one somewhat wider annulus on basal third. Pronotum (fig. 119A) piceous; anterior lobe with a complex pattern of white pile, hind border and 1+1 large, longitudinal vittae stramineous. Scutellum and metanotum piceous, their posterior margins and spine of metanotum whitish. Pleura and sterna of mesothorax and metathorax piceous. Legs stramineous. Coxa of forelegs with a faint, subapical, darker spot. Femur brown on basal third, and with two small submedian spots and a very dark subapical annulus; tibiae with a very dark subbasal and a less intense apical annuli; tarsi dark. Mid and hind femora with one or two faint submedian and one distinct subapical fulvous annuli; tibiae with one subbasal annulus of same color. Forewings whitish hyaline, their veins whitish or flavescent, piceous along basal margin of discal cell and on apex of pterostigma; spots on cell fulvous, somewhat darker on base and apex of discal cell; their distribution as shown in figure 119I. Hind wing hyaline white, with distinct fulvous spots as shown in figure 119G. Abdomen stramineous, somewhat darkened behind.

Body and appendages polished; hind lobe of pronotum dull. Long hairs in moderate number on head, ventral surface of thorax, antennae, and legs; rest of body either glabrous (hind lobe of pronotum) or with short pile, wool-like on parts of head, anterior lobe of pronotum, pleura, and basal abdominal sternite.

Head as shown in figure 119A, B; fore lobe moderately elevated. Eyes large; distance between eyes dorsally equal to width of eyes in both sexes; in lateral view, eyes remote from ventral surface of head. Rostrum as shown in figure 119B. Hairs of first segment of antennae several times length of diameter of segment in both sexes. Length of first segment (female), 3.5 mm.; relative length of segments, 1/0.95/0.36/0.28.

Pronotum as shown in figure 119A, B; fore lobe polished, pattern formed by woolly pile as illustrated. Hind lobe faintly wrinkled transversely, with a median longitudinal depression, corresponding to dark median zone. Scutellum with a faint median tubercle posteriorly. Metanotum subsemicircular, its spine short, about half as long as metanotum along mid line.

Forelegs as given in generic description and shown in figure 119C–E. Coxa as long as pronotum. Larger spines of ventral surface of femur not more than one-third of diameter of

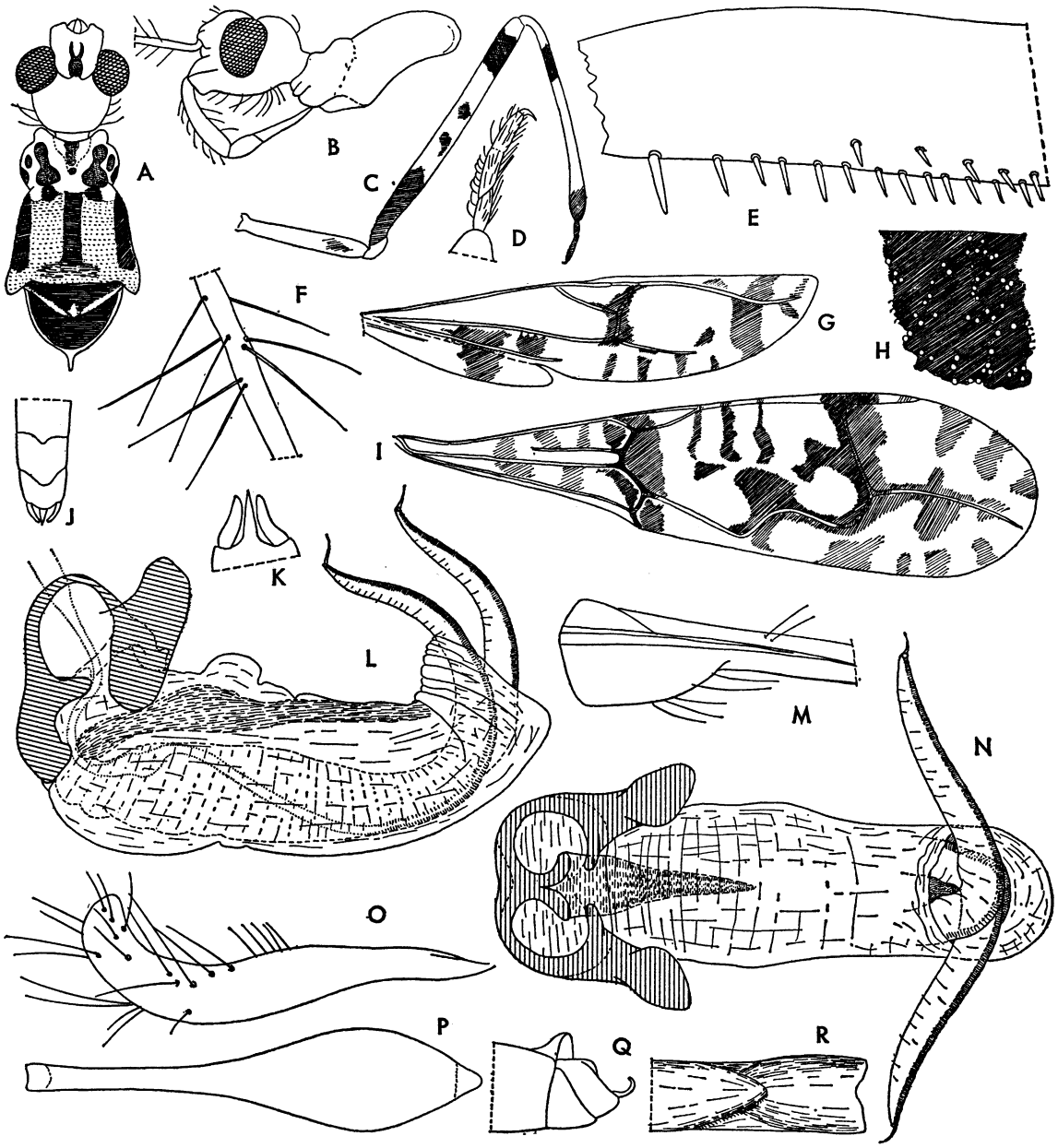


FIG. 119. *Mesosepis papua*, male. A. Anterior portion of body, seen from above, with color pattern. B. Head and thorax, lateral view. C. Outlines of foreleg, with color pattern. D. Fore tarsus. E. Base of fore femur. F. Portion of posterior femur. G. Hind wing, with color pattern. H. Detail of structure of forewing. I. Forewing. J. Apical portion of abdomen, seen from below. K. Apex of pygophore, seen from behind. L. Phallus, lateral view. M. Base of abdomen, lateral aspect. N. Phallus, dorsal view. O. Paramere. P. Outlines of abdomen. Q. Genital region, side view. R. Base of abdomen, seen from below.

segment. Posteroventral series composed of about three larger and 40 shorter spines, anteroventral series of about three larger and 55 shorter spines. Tibia and tarsus as given in generic description. Claws of forelegs and mid and hind legs as given in generic description; hind femora surpassing apex of forewing by about 0.3 mm.; bristles of femora as shown in figure 119F.

Shape and venation of forewings as shown in figure 119I. Surface slightly but distinctly wrinkled irregularly. Dark spots dotted with sparse, irregularly distributed, minute, hyaline, rounded spots (fig. 119H). Forewings surpassing apex of abdomen by about 0.7 mm. Hind wings reaching to apex of abdomen; their shape and venation as shown in figure 119G.

Abdomen strongly narrowed at base, gradually widening toward posterior third, narrowed again toward apex in female, sides of apical portion subparallel in male (fig. 119P). Basal abdominal sternite deeply excised posteriorly (fig. 119R). Apical segments of male as shown in figure 119J, K, P, Q. Last tergite short, covering only basal half of pygophore. Posterior process of latter spinelike, relatively wide at base, pointed apically (fig. 119J, K). Shape and chaetotaxy of parameres as shown in figure 119O. Phallus as given in generic description and illustrated in figure 119L, N.

The male and the two females examined agree in all essential morphological and color characters. Though from a different locality and higher altitude, one of the females is thus designated as allotype; the other, as a paratype.

MATERIAL EXAMINED: New Guinea: Papua: Kokoda, August to September, 1933, 1200 feet [L. E. Cheesman; British Museum (Natural History)], one male; Papua: Mafulu, December, 1933, to January, 1934, 4000 feet [L. E. Cheesman; British Museum (Natural History)], one female allotype, one female paratype.

NESIDIOLESTES KIRKALDY

Nesidiolestes KIRKALDY, 1902, p. 152.

DESCRIPTION: Apterous. Small species (9–11 mm.).

Body surface smooth, not shining; with scarce, short setae only. General color (preserved specimens) piceous, with stramineous markings; antennae and legs conspicuously annulated.

Head elongate, fusiform in dorsal view, subtruncate anteriorly in lateral view. Sides of anteocular portion subparallel, of postocular gradually converging posteriorly in dorsal view, both conspicuously elevated above in lateral view. Anteocular and postocular of identical length. Interocular furrow situated behind level of center of eyes, not surpassing level of posterior border of same, faintly bisinuate. Eyes small, far remote from level of dorsal and ventral surfaces of head. Rostrum bent between first and second segments; first cylindrical, not quite attaining center of anteocular portion; second about as long as first, subcylindrical, attaining or surpassing level of anterior border of eyes; third longer than either first or second. Antennae inserted near anterior border of head; lacking long hairs in both sexes.

Fore lobe of pronotum shorter than head, oval in dorsal view, sides moderately convex above, strongly converging posteriorly; disc with shallow, median, longitudinal impression. Hind lobe strongly reduced, transverse, covering only extreme base of mesonotum. Mesonotum and metanotum together about as long as pronotum. Mesonotum somewhat longer than wide, metanotum as long as wide, both with faint, median, longitudinal carina and short process at center of hind border. First abdominal tergite faintly tuberculate at middle.

Forelegs very stout, as long as whole body. Fore coxa almost as long as head and prothorax together. Femur stout, slightly S-shaped, ventral surface with very dense, slender, erect hairs which are shorter than diameter of segment, and two series of spines. Posteroventral series of femur beginning at base of segment, composed of three to five regularly spaced, large, and numerous shorter, spiniferous processes, apical spines shorter than, as long as, or longer than, their respective bases; largest processes combined with their spines somewhat shorter than diameter of segment. Anteroventral series beginning slightly to distinctly apicad of base of posteroventral series, composed of short spines inserted on wartlike bases, widely interrupted at base, one larger spine basad of

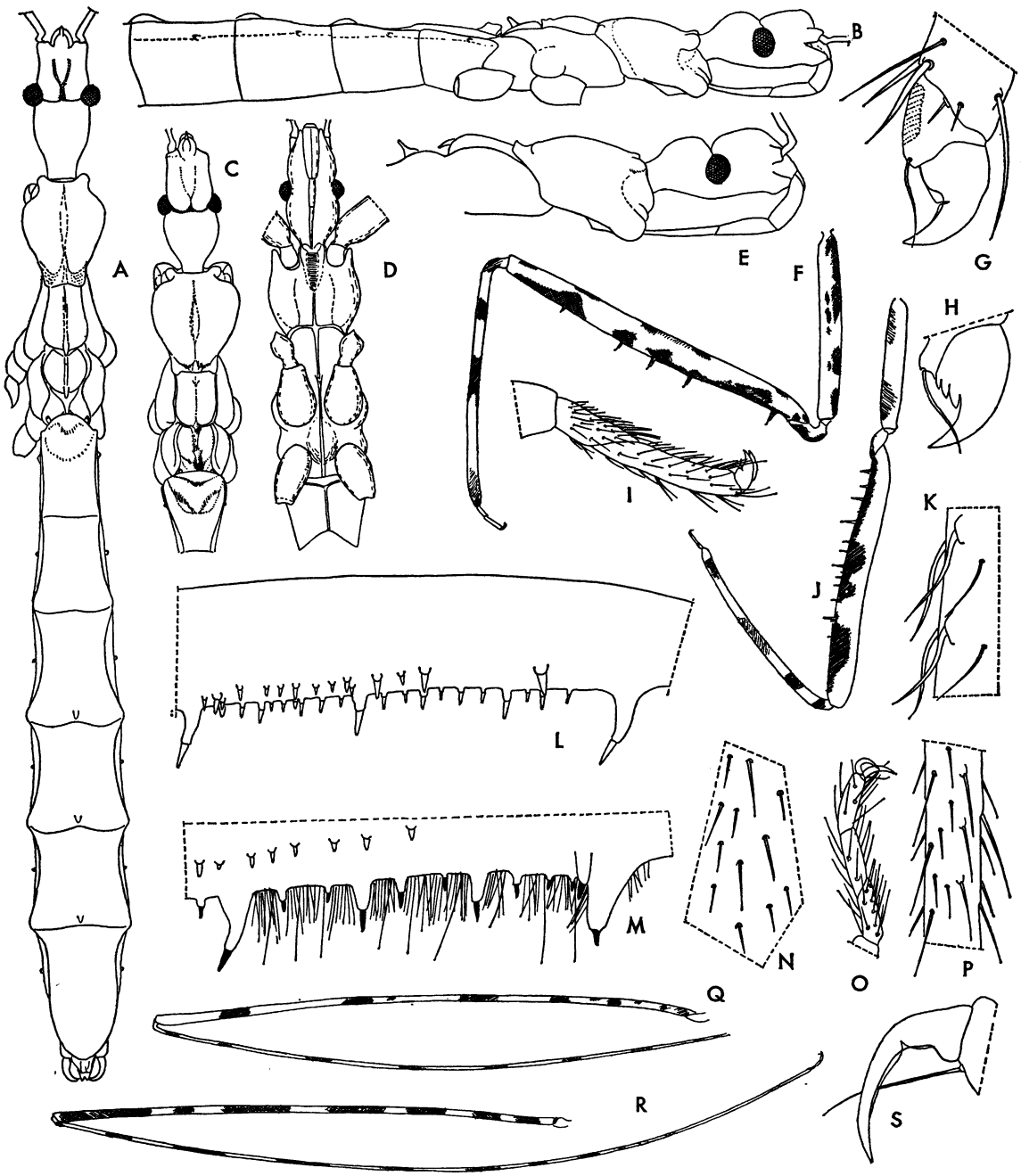


FIG. 120. A. *Nesidiolestes roberti*, male, general aspect. B–D. *Nesidiolestes insularis*, female. B. Anterior portion of body, side view. C. Anterior portion of body, seen from above. D. Anterior portion of body, ventral aspect. E, F. *Nesidiolestes roberti*, male. E. Anterior portion of body, lateral view. F. Foreleg, with color pattern. G–K. *Nesidiolestes insularis*. G. Apex of fore tarsus, with praetarsus and inner claw. H. Outer claw of foreleg. I. Fore tarsus. J. Foreleg, with color pattern. K. Setae of under surface of fore tibia. L. *Nesidiolestes roberti*, base of fore femur. M–Q. *Nesidiolestes insularis*. M. Under surface of base of fore femur. N. Setae of hind femur. O. Posterior tarsus. P. Portion of hind tibia. Q. Second pair of legs, with color pattern. R. *Nesidiolestes roberti*, second pair of legs, with color pattern. S. *Nesidiolestes insularis*, claw of hind leg.

interruption, remainder composed of small to very small spines. Apical portion of femur with irregular series of small teeth. Tibia three-fourths as long as femur, its under surface with two rows of strong, inclined setae. Tarsus two-segmented, about one-ninth as long as tibia, hairy on all surfaces, basal about half as long as apical segment. Claws subequal in size, inner one with a medially incised, ventral lamella, outer one with three small, subbasal processes. Mid and hind legs long and slender, posterior femora considerably surpassing apex of abdomen. Femora and tibiae both with microchaetae and macrochaetae. Segments of mid and hind tarsi subequal in size. Claws slender, conspicuously curved, with a medially incised, ventral lamella. Abdomen slightly widened toward middle; connexival margins distinctly lobulate. Basal portion not conspicuously constricted; basal sternite keeled, its posterior margins triangularly excised. Surface of tergites and sternites with microchaetae and macrochaetae.

Male: Seventh tergite not significantly longer than remainder, tongue-shaped, completely covering genital region from above. Eighth sternite very large. Pygophore small, not more than one-seventh of total length of abdomen, its basal half covered by eighth sternite, its apical border (at least in one species) with a wide, apically bifid process; its dorsal surface sclerotized for most of its length. Parameres slender, slightly widened distally, with a conspicuous, slender, apical point. Articulatory apparatus of phallus short. 1+1 sclerotized areas laterally on membrane connecting stapes to phallotheca. Struts well developed, directed toward dorsal wall of phallotheca, fused on basal, widely divergent on apical, half. Phallotheca subcylindrical, partially sclerotized. Vesica arms extremely elongated, membranous, simple and relatively wide on basal third, then abruptly constricted and filiform.

Female: Eighth and ninth tergites almost completely fused; eighth occupying most of dorsal, ninth most of lateral, surface formed by resulting sclerite. Seventh sternite strongly salient at middle. Gonocoxites well developed; gonapophyses strongly reduced, with a single bristle only. Syngonapophysis small but well developed, partially pigmented, setae reduced in number.

TYPE SPECIES: *Nesidiolestes selium* Kirkaldy (monobasic).

DISTRIBUTION: Hawaiian Islands.

OBSERVATIONS: The taxonomic position of this genus has only now become clear. The structure of the male genitalia shows that it belongs in the Ploiariolini. Its exact position within the tribe cannot be established. It is distinguished from all other genera by the complete loss of its wings, the relatively large and stout body, the elongate head, the relatively large spiniferous processes of the fore femur, and the comparatively well-developed syngonapophysis of the female. Superficially, *Nesidiolestes* is similar to certain apterous metapterines. There is no reason to suppose that anything but convergence is responsible for this over-all similarity.

There is no evidence for establishing a close relationship between *Nesidiolestes* and the other endemic Hawaiian ploiarioline genus, *Saicella*, or to derive one from the other or from an immediate common ancestor. It is obvious that these two genera or their respective ancestors descended from two different immigrants.

The first species of *Nesidioletes*, *selium*, was described from the island of Hawaii, and the second, *insularis*, from Oahu. Zimmerman (1948) synonymized these species without having examined *selium*. The encounter of a species of *Nesidiolestes* on Kauai, described below, clearly different from the Oahu *insularis*, proves that more than one species of *Nesidiolestes* occurs in the Hawaiian Islands. This fact, together with the apterous condition of the species of the genus, seems sufficient ground for considering the Hawaiian population as specifically different from the populations from Oahu and Kauai, until definitive evidence to the contrary becomes available.

The characters used for including *selium* in the key are taken from the original description. Examination of actual specimens may make some modifications necessary.

KEY TO THE SPECIES OF *Nesidiolestes*

1. First antennal segment six times as long as head; fore femora a little longer than coxae . . . . . *selium*
   First antennal segment not more than five

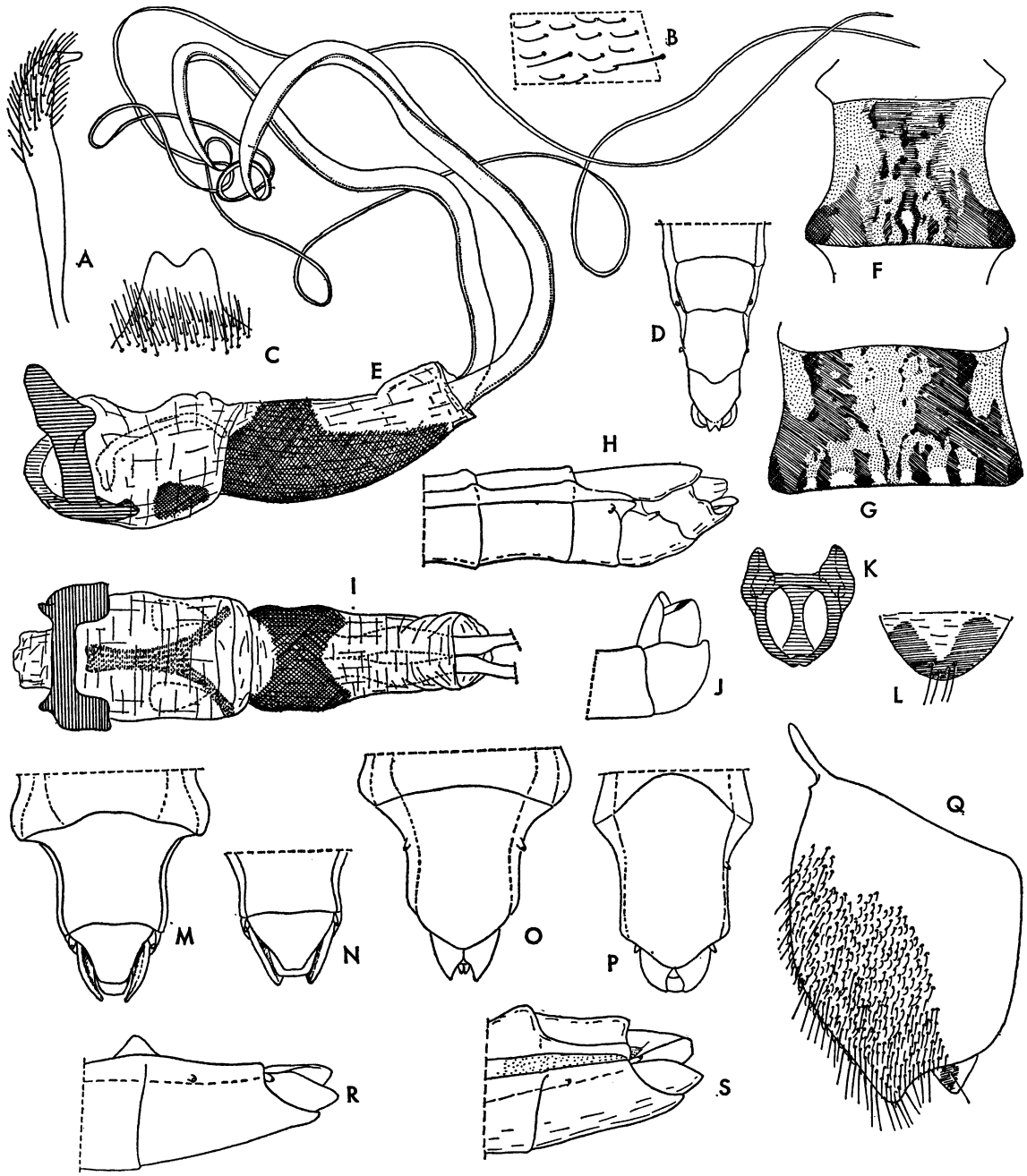


FIG. 121. A–1. *Nesidiolestes roberti*, male. A. Paramere. B. Setae of sternite. C. Apex of pygophore, high magnification. D. Apex of abdomen, ventral view. E. Phallus, lateral aspect. F. Fifth tergite, with color pattern. G. Fifth sternite, with color pattern. H. Distal portion of abdomen, lateral view. I. Phallus, dorsal aspect; only base of vesica arms shown. J. *Nesidiolestes selium*, male, genital region, lateral view. K–M. *Nesidiolestes roberti*. K. Articulatory apparatus. L. Syngonapophysis. M. Apical region of abdomen of female, dorsal view. N. *Nesidiolestes insularis*, female, genital region, dorsal view. O. *Nesidiolestes roberti*, female, genital region, ventral aspect. P. *Nesidiolestes insularis*, female, genital region, ventral view. Q. *Nesidiolestes roberti*, gonocoxite with gonapophysis. R. *Nesidiolestes insularis*, female, apex of abdomen, side view. S. *Nesidiolestes roberti*, female, apical portion of abdomen, lateral aspect. (J, sketch made by R. L. Usinger from type.)

times as long as head; fore femora approximately twice as long as coxae 2

2. Most dark annuli of mid and hind femora narrower than intervening light-colored spaces (fig. 120Q) . . . . . *insularis*

Most dark annuli of mid and hind femora wider than intervening light-colored spaces (fig. 120R) . . . . . *roberti*

Nesidiolestes insularis Kirkaldy

Figures 120B–D, G–K, M–Q, S; 121N, P, R

Nesidiolestes insularis KIRKALDY, 1908a, p. 195.
Nesidiolestes selium: ZIMMERMAN, 1948, p. 129, fig. 49.

The specimen listed below is the one figured by Zimmerman (1948). Some of its characters are illustrated here.

MATERIAL EXAMINED: Hawaiian Islands: Oahu: Mt. Kaala, March 6, 1938 (E. C. Zimmerman; Bernice P. Bishop Museum), one female.

DISTRIBUTION: Hawaiian Islands (Oahu).

TYPE: Female, Bernice P. Bishop Museum.

Nesidiolestes roberti, new species

Plate 2, figure 7; text figures 4F; 11J; 13B; 120A, E, F, L, R; 121A–I, K–M, O, Q, S

DESCRIPTION: Male and female: Length of male, 9.5; of female, 11 mm.

General color green in life, piceous in preserved specimens. Head stramineous laterally behind eyes, dorsally along middle on postocular and posterior half of anteocular region, latter with Y-shaped, dark markings on antenniferous tubercles and on clypeus. Distal half of first and entire second rostral segment stramineous. Antennae piceous. First segment with seven equidistant annuli flavous, intervening dark portions at least twice as wide as light-colored areas; a faint subapical annulus testaceous. Second antennal segment with three narrow flavous annuli on basal half. Thorax extensively clouded with stramineous to ochraceous; similarly colored spots on lateral surface of thorax, mainly at upper margin of acetabula, and quite extensive on metapleura. General color of abdomen dark, segments clouded and spotted with ochraceous and stramineous as shown in figure 121F, G; connexival lobes very dark. Posterior border of tergites with one central, of sternites with 3+3 sublateral, ivory-colored spots, the latter slightly embossed. Spiracles whitish. General color of genital segments dark; posterosuperior process of pygophore shining black distally. Pattern of forelegs as shown in figure 120F. Coxae of mid and hind legs piceous on ventral, stramineous on dorsal, surface. Trochantera pale. Femora dark, with six to eight narrow, ochraceous annuli (fig. 120R) which are narrower than intervening dark spaces; subapical annulus faint. Tibiae with more than eight light-colored annuli, those on basal half about as wide as intervening dark spaces, becoming progressively shorter and less distinct toward apex of tibia.

Surface of body matte, legs and genital region of male slightly shining. Short, inconspicuous, golden pubescence on head and thorax, very sparse on abdomen.

Head and rostrum as given in generic description and shown in figure 120A, E. Anteocular portion rather strongly convex above in lateral view. First antennal segment about six times as long as head, its length 6.5 mm.; relative length of antennal segments, 1/1.0/0.17/0.23.

Thorax as given in generic description and shown in figure 120A, E. Mesonotal process spiniform, horizontal; metanotal spine obliquely upwardly directed.

Structure and chaetotaxy of legs as given in generic description and shown in figure 120F, L; generally very similar to conditions found in *N. insularis* (fig. 120G–I, K, N–Q, S). Fore coxa much longer than head (1.6/1), fore femur almost twice as long as coxa and about 11 times as long as maximum width. Posteroventral series composed of four to five larger and more than 40 small to very small spiniferous processes; anteroventral series composed of one medium-sized basal, and about 35 short to very short, spines; basal process situated distinctly apicad of first process of posteroventral series.

Shape of abdomen of male as shown in figure 120A, that of female similar, though somewhat more widened toward middle. Second through fourth tergites with a small tubercle before center of hind border. Genitalia of both sexes as given in generic description and shown in figure 121A, C–E, H, I, K–M, O, Q, S.

MATERIAL EXAMINED: Hawaiian Islands: Kauai, Kokee, Kawaki Stream, August 16–

17, 1961, beating tree ferns (R. L. Usinger; Bernice P. Bishop Museum), one male holotype, one female allotype; (R. L. Usinger; Bernice P. Bishop Museum), one male paratype; [R. L. Usinger; British Museum (Natural History)], one male paratype; (R. L. Usinger; collection Usinger), one male paratype; (R. L. Usinger; the American Museum of Natural History), one male paratype; (R. L. Usinger; collection Usinger), numerous nymphs; (R. L. Usinger; the American Museum of Natural History), numerous nymphs.

OBSERVATIONS: This species is named for its collector, Robert L. Usinger, who made a special effort to obtain the series. The color characters mentioned in the key are sufficient to distinguish *roberti* from *insularis*. Once the male of the latter becomes known, additional differential characters will probably be found in the genital organs. The head and thorax of the two species seem also to be different, especially in lateral view (fig. 120B, E); the mesonotal process, developed as a distinct though short spine in *roberti*, is reduced to a short truncate process in the single specimen of *insularis* now examined (fig. 120B). The fore femur of *insularis* (fig. 120J) is relatively stouter (length about nine times its maximum width), the color pattern seems somewhat different, and the basal process of the anteroventral series is situated at almost the same level as the basal process of the posteroventral series (fig. 120M). The slight differences in the proportions of the genital segment of the female (fig. 121M–P, R, S) are difficult to judge as to their taxonomic value but may be significant.

Nesidiolestes selium Kirkaldy

Figure 121J

Nesidiolestes selium KIRKALDY, 1902, p. 53.

The illustration represents a sketch made by R. L. Usinger from the genital region of the holotype.

DISTRIBUTION: Hawaiian Islands (Hawaii).

TYPE: Male, British Museum (Natural History) (labeled as *olana* Kirkaldy).

PANAMIA KIRKALDY

Panamia KIRKALDY, 1907, p. 249.

DESCRIPTION: Macropterous. Small species (7–8 mm.).

Body surface partly dull, mostly shining, with short and isolated long hairs; lacking wool-like pile. Basic color whitish to stramineous; legs with very faint darker annuli, faint pattern elements on head and body, dark spots on forewing irregular in shape.

Head short, anteocular and postocular region of subequal size, only slightly elevated dorsally. Anteocular with sides subparallel in dorsal view; postocular semiglobular in dorsal and lateral aspects. Eyes large. Rostrum conspicuously bent between first and second segments; first slender, second hardly shorter than first, very slightly swollen only, third slightly longer than first. Antenniferous tubercles large; antennae inserted midway between anterior border of eyes and apex of head. Interocular furrow situated about at level of middle of eyes.

Pronotum completely covering mesonotum, distinctly constricted before middle; lateral carinae lacking. Fore lobe longer than wide, its sides subparallel, slightly converging posteriorly, its disc posteriorly at center with a punctiform or oval impression; surface shining. Posterior lobe longer than wide, longer than fore lobe, its sides slightly diverging posteriorly, its surface rugose. Scutellum elevated but lacking spine; metanotum with a median, longitudinal ridge and small, posterior spine; first abdominal tergite with distinct spine.

Forelegs slender. Coxa and trochanter simple. Femur with two series of processes. Posteroventral series beginning near but not at base of article, composed of four to five short, and numerous very short, spiniferous processes, former much shorter than diameter of segment. Anteroventral series beginning somewhat apicad of base of posteroventral series, not interrupted at base, composed of very small spiniferous processes only. Fore tibia slender, three-fourths to four-fifths as long as femur, ventrally with two series of strong, decurved setae. Fore tarsus about one-fifth as long as tibia, three-segmented, not heavily chitinized, hairy on all surfaces, its ventral bristles rather stiff, especially on basal segment. First segment very slightly longer than either second or third. Claws of identical size, one simple, other with a small, submedian, ventral projection. Mid and hind legs slender, posterior

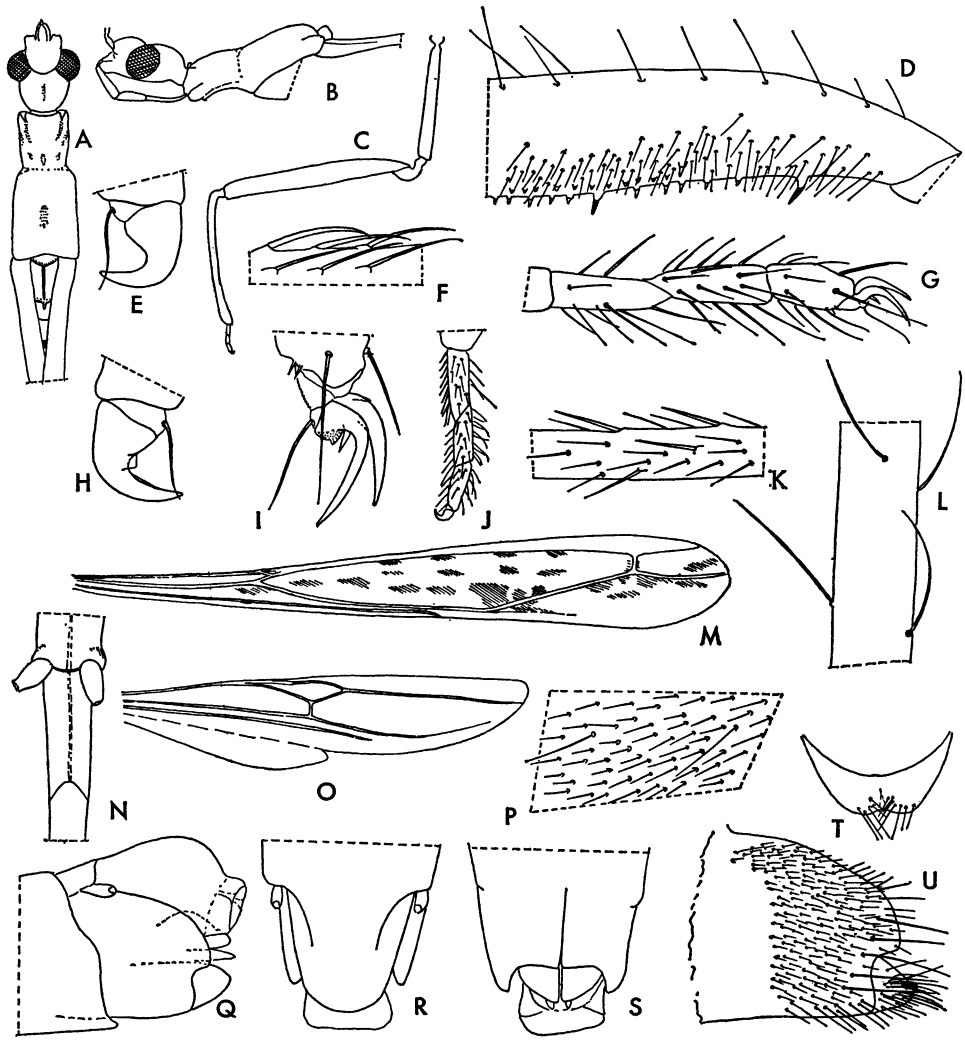


FIG. 122. *Panamia ornata*, female. A. Anterior portion of body, dorsal view. B. Anterior portion of body, lateral view. C. Outlines of foreleg. D. Base of fore femur. E. Outer claw of fore tarsus. F. Setae of under surface of fore tibia. G. Posterior tarsus. H. Inner claw of foreleg. I. Apex of posterior tarsus, with praetarsus and claws. J. Fore tarsus. K. Portion of hind tibia. L. Detail of posterior femur. M. Forewing, with color pattern; specimen from Peru. N. Metathorax and base of abdomen, ventral view. O. Hind wing. P. Setae of sternite. Q. Genital region, lateral view. R. Genital region, seen from above. S. Genital region, ventral aspect. T. Syngonapophysis. U. Gonocoxite and gonapophysis.

femora distinctly surpassing apex of abdomen. Femora with isolated long hairs; tibiae with microchaetae and macrochaetae. First tarsal segment slightly longer than second, third shortest; all with simple long setae. Claws slender, conspicuously curved, with a long, pointed, basal process.

Surface of forewings smooth. Discal cell large, truncate apically, pointed at base. M and Cu completely fused basad of cell. Short vein connecting base of cell to Sc present. Pterostigma carried almost to apex of wing. Hind wing with venation complete. R+M and Cu not connected beyond cross vein, simple.

Abdomen elongate, strongly compressed

dorsoventrally at base, but not abruptly constricted. Hind margin of basal sternite deeply incised. Sternites and tergites with microchaetae and macrochaetae.

Male: Eighth sternite large, covering about half of length of pygophore; posterosuperior process of latter elongate, spinelike. Parameres slender, curved apically. Phallus not examined.

Female: Eighth and ninth tergites apparently fused, hood-shaped, rounded posteriorly. Gonocoxites very large, extended on lateral surface of genital region. Syngonapophysis membranous, semicircular, bearing bristles posteriorly at middle.

TYPE SPECIES: *Lutevopsis ornata* Champion (monobasic).

DISTRIBUTION: Neotropical Region.

OBSERVATIONS: *Panamia* is very closely related to the equally neotropical *Malacopus* Stål and the Old World *Ademula* McAtee and Malloch. The generic key shows the main apparent differences. Possibly the male genitalia, once they can be examined, will show additional distinguishing characters.

Panamia ornata (Champion)

Figure 122A–U

Lutevopsis ornata CHAMPION, 1898a, p. 166, pl. 10, figs. 11, 11a.

Panamia ornata: KIRKALDY, 1907, p. 249.

The main characters of *Panamia* are illustrated here for the female sex.

Though only one species has been described for the genus, female specimens from Cuba, Panama, Trinidad, Colombia, Peru, and Brazil now before me are indicative of the existence of additional species, at least on the basis of color characters. Unless males become available from different localities, the genus will remain poorly understood.

DISTRIBUTION: Panama.

TYPE: British Museum (Natural History).

SAICELLA USINGER

Saicella USINGER, 1958, p. 437.

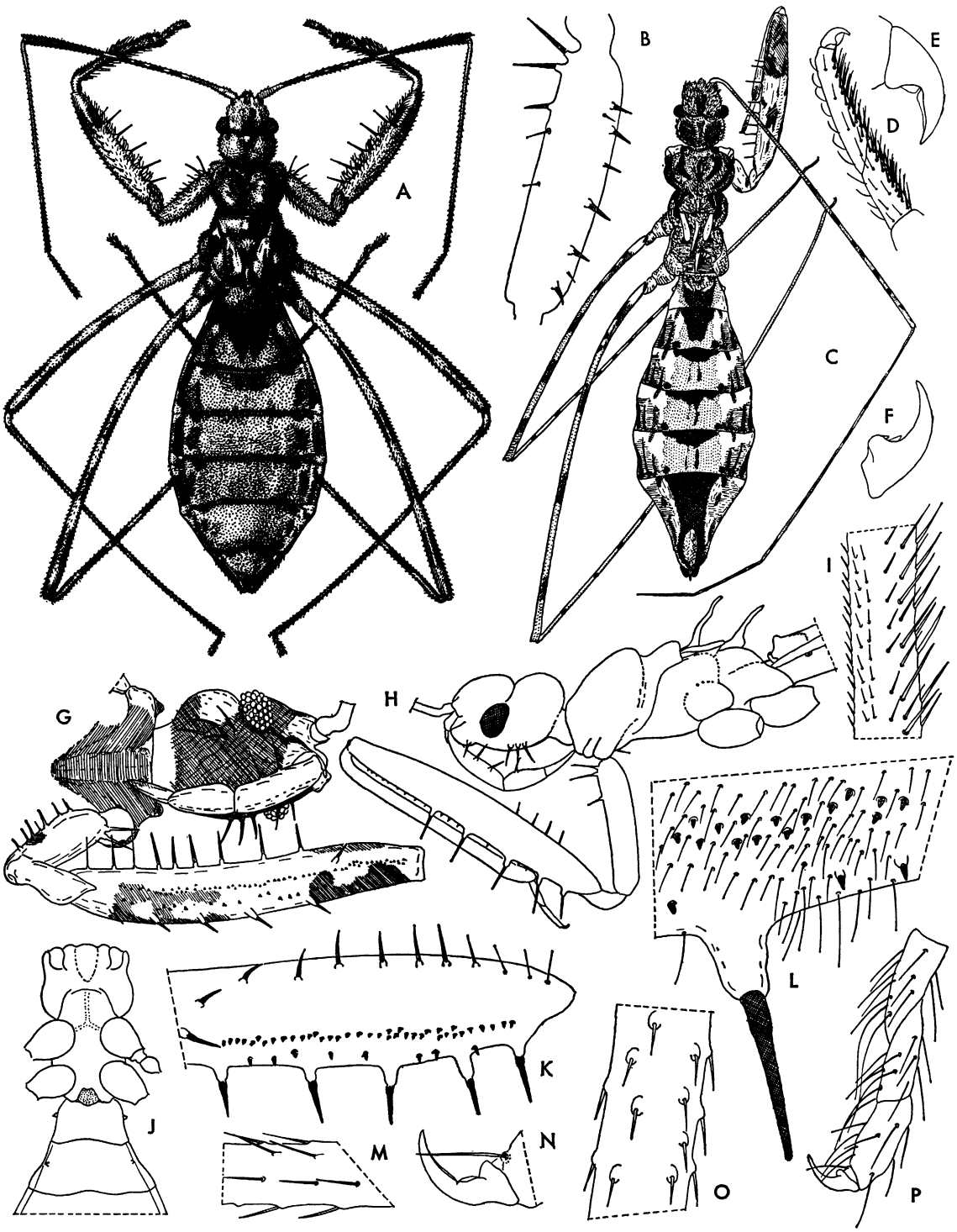
DESCRIPTION: Micropterous. Small species (4.7–6 mm.).

Body surface shining; long hairs lacking portions of head, thorax, and basal abdominal segment with short, dense, adpressed, wool-like pile. General color flavous, pattern elements red and piceous to black; abdomen and legs conspicuously patterned.

Head short, anteocular shorter than postocular portion, both strongly convex above. Anteocular with sides subparallel in dorsal view, postocular subsemiglobular in dorsal and lateral aspects. Eyes small, far remote from level of dorsal and ventral surfaces of head. Rostrum bent between first and second segments; first surpassing level of posterior border of eyes, cylindrical; second half to slightly less than half as long as first, somewhat swollen; third slender, shorter than second. Antenniferous tubercles large; antennae inserted near anterior border of head. Antennae lacking long hairs in both sexes. Interocular furrow slightly bisinuate, situated behind level of middle of eyes, not surpassing level of posterior border of eyes. Ventral surface of head with 1+1 spinelike setae shortly behind insertion of rostrum, as well as 1+1 groups of three (or four) spinelike setae each, behind level of posterior border of eyes. Upper surface of first rostral segment with 2+2, of second segment with 1+1, similar spinelike setae.

Pronotum covering only anterior half of mesonotum. Fore lobe subglobular, somewhat wider than long, with a deep, median, longitudinal impression at middle, disc strongly elevated between center and lateral margins. Hind lobe transverse. Anterior acetabula opening obliquely forward and downward. Exposed portion of mesonotum about as long as hind lobe of pronotum, with well-developed spine. Metanotum subequal in length to mesonotum, wider than long, with well-developed spine. First abdominal tergite tuberculate at middle. Prosternum occasionally with one or two spinelike setae.

Forelegs stout. External dorsal surface of coxa near base with two large spines inserted on short, wartlike bases, followed by two to three shorter and partially more slender similar spines; internal dorsal surface with six to eight similar but much shorter spines or short setae. Trochanter unarmed. Posteroventral surface of femur with five to seven elongate, laterally directed spines inserted on short bases; length of spines and their bases combined slightly less than diameter of segment; a few slender, spinelike setae intermixed with spines near base of segment.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P

Anteroventral surface of femur with six to eight similar but shorter, laterally directed spines, series continued toward base of article with a few long, spinelike setae; apically, series curved toward disc of under surface of femur. Two accessory series on disc of under surface of segment, that accompanying posteroventral series composed of very short, isolated spines arranged in one irregular series, that accompanying anteroventral series consisting of even smaller but more numerous spinulets arranged in one to two irregular series. Tibia slender, about four-fifths as long as femur, its under surface with two rows of strong, inclined setae. Tarsus one-fourth as long as tibia, two-segmented; basal segment slightly shorter than second. Both segments with short setae on lateral and dorsal surfaces, those of under surface numerous, not specialized. Claws curved, inner one with a medially incised, ventral lamella, outer one with two small, subbasal projections. Mid and hind legs slender, hind femora surpassing apex of abdomen. Femora and tibiae with short setae of uniform size, those of tibiae somewhat longer than those of femora. Tarsal segments subequal in size, all with long hairs in moderate number. Claws slender, curved, ventrally with medially incised lamella.

Forewing pads very short, almost attaining, or slightly surpassing, hind border of metanotum.

Abdomen fusiform, widest at about middle, broadly inserted on thorax, not constricted at base. Basal sternite not convex, its hind margin slightly emarginated. Surface of tergites and sternites with microchaetae and macrochaetae, lacking wool-like pile with exception of basal segment.

Male: Seventh tergite much larger than remainder, tongue-shaped posteriorly, completely covering genital segments from above. Eighth sternite fully visible, very large. Pygophore large, occupying more than one-fourth of total length of abdomen, though covered for its greater part by eighth sternite; sclerotized dorsally for most of its length. Posterosuperior process tongue-shaped, with a short, spinelike point. Parameres short, simple, with simple setae. Articulatory apparatus short; basal plates fused on apical half, forming a slender sclerite. 1+1 sclerotized lateral areas on membrane connecting stapes to phallotheca. Struts well developed, directed toward dorsal wall of phallotheca, but not attaining same, fused on basal, widely divergent on apical, half. Phallotheca short, tubular, uniformly sclerotized. Conjunctiva subcylindrical, membranous, lacking projections. Vesica arms consisting of wide, rugose, basal, and very slender apical, portion of simple structure; apex of basal portion coiled, somewhat sclerotized.

Female: Eighth tergite transverse, rounded behind; ninth distinctly separated from eighth, trapezoidal. Seventh sternite very large, covering most of gonocoxites from below; latter and gonapophyses normal. Syngonapophysis strongly reduced, membranous.

TYPE SPECIES: *Saicella smithi* Usinger.

DISTRIBUTION: Hawaiian Islands.

OBSERVATIONS: This genus, placed by Usinger (1958) with some doubt in the Saicinae, is here included in the Emesinae. The structure of its claws agrees with that possessed by the more specialized genera of the latter subfamily; the male genital system (phallus and internal organs) places the genus among the Ploiariolini. Within the latter group, *Saicella* occupies apparently an isolated position owing to the presence of spines on the under surface of the head, the rostrum, and the fore coxa; this condition being plesiomorphic in the group, its significance is minor from a phylogenetic point of view. The presence of wool-like pile on the head, thorax, and basal abdominal segment is a specialized character found also in the

---

FIG. 123 (OPPOSITE PAGE). A. *Saicella smithi*, female, general aspect, with color pattern. B–P. *Saicella usingeri*, male. B. Fore coxa, ventral view. C. General aspect, with color pattern. D. Fore tarsus. E, F. Claws of foreleg. G. Head, prosternum, and basal articles of foreleg, inferolateral view. H. Anterior portion of body, lateral aspect. I. Portion of fore tibia. J. Thorax and base of abdomen, seen from below. K. Basal two-thirds of fore femur, ventral aspect. L. Detail of fore femur at level of third large process. M. Portion of hind tibia. N. Claw of hind leg. O. Portion of posterior femur. P. Posterior tarsus. (A from Usinger, 1958.)

genera around *Emesopsis*. The structure of the phallus of *Saicella* is comparable to that of the last-mentioned genus. It is concluded that *Saicella* belongs to the group of genera around *Emesopsis*, representing a plesiomorphic branch.

Saicella and *Nesidiolestes* are unique not only in being the only Hawaiian endemic genera among the Emesinae, but also in being the only Ploiariolini that have suffered a strong reduction or loss of the wings.

So far, two species of *Saicella* are known, one from Maui and one from Kauai. It is likely that additional species exist on several of the other islands.

KEY TO THE SPECIES OF *Saicella*

Length, slightly less than 5 mm. First segment of antennae three times as long as head. Pads of forewings reaching base of abdomen. Seventh abdominal tergite uniformly colored. Dark annuli of mid and hind legs about as wide as, or wider than, intervening light-colored regions (fig. 123A) . . . . . *smithi*

Length, 5.5 mm. First segment of antennae more than four times as long as head. Pads of forewings not surpassing center of metanotum. Seventh abdominal tergite with a very conspicuous median, dark marking. Dark annuli of mid and hind legs mostly narrower than intervening light-colored regions (fig. 123C) . . . . . *usingeri*

Saicella smithi Usinger

Figure 123A

Saicella smithi USINGER, 1958, p. 440, figs. 1A, 1B.

The figure here reproduced is taken from the original description.

DISTRIBUTION: Hawaiian Islands (Maui).

TYPE: Female, British Museum (Natural History).

Saicella usingeri, new species

Figures 11G; 13C, D; 123B–P; 124A–M

DESCRIPTION: Male and female: Length, 5.5 mm.

General color whitish to stramineous. Head and thorax piceous at sides and below, ochraceous to stramineous above; head laterally with a light-colored spot behind eyes. Rostrum and antennae stramineous to ochraceous; first and second segments of latter with six to eight irregularly distributed dark annuli as wide as, or shorter than, intervening light spaces. Eyes red. Spines of mesonotum and metanotum stramineous. Markings of dorsal surface of abdomen piceous, their distribution as shown in figure 123B; lateral regions sanguineous. Ventral surface of abdomen with sternites darkened along hind border; eighth sternite almost completely dark. Forewing pads testaceous. Legs of general body color, markings piceous. Fore coxa with subapical spot or narrow annulus. Apical fourth of fore femur with wide annulus clouded with lighter; basal three-fourths of femur variegated and marbled with dark, with exception of anteroventral surface. Fore tibia with three incomplete annuli, one subbasal, one submedian, one apical. Spines of coxa and femur dark, their basal tubercles whitish. Coxae of mid and hind legs faintly marbled with dark. Extreme base of femora darkened, remainder of segment with four annuli which are narrower than intervening light-colored spaces; one or two spots between first and second annuli. Tibiae with up to 11 very narrow, dark annuli on basal two-thirds of article.

Surface of body shining, pronotum polished. Yellowish wool-like pile covering most of head (except interocular furrow and Y-shaped region on anteocular portion dorsally), lateral and ventral region of thorax, mesonotum, and metanotum and fore lobe of pronotum along center longitudinally, along lateral margins forming a carina-like line, and 1+1 curved lines on lateral halves of disc, as well on basal abdominal segment dorsally and ventrally.

Head and rostrum as given in generic description and shown in figure 123C, G, H. Distance between eyes dorsally equal to more than three times their width. First article of antennae almost five times as long as head, its length 4.2 mm.; relative length of segments, 1/0.9/0.19/0.16.

Thorax as given in generic description and shown in figure 123C, G, H, J. Fore lobe of pronotum faintly reticulated microscopically. Hind lobe rather coarsely rugose obliquely, carinate along middle longitudinally. Mesonotal and metanotal spines elongate, slender, inclined backward, beset with sparse short hairs. Pads of forewings very narrow, attaining center of metanotum. Prosternum oc-

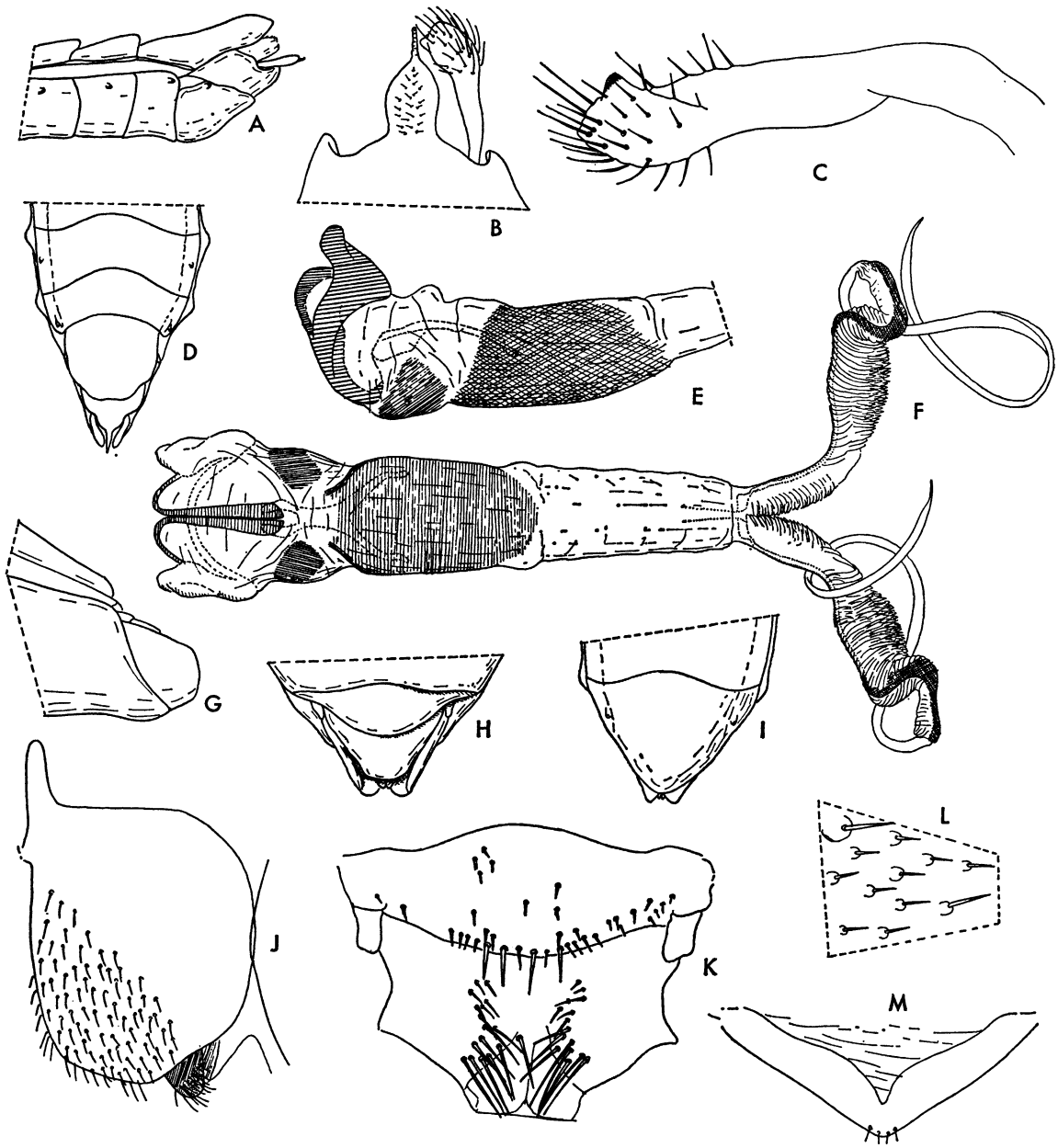


FIG. 124. *Saicella usingeri*. A. Apical portion of abdomen of male, lateral aspect. B. Apex of pygophore, high magnification. C. Paramere. D. Distal portion of abdomen of male, seen from below. E. Phallus, lateral view; only base of conjunctiva shown. F. Phallus, ventral aspect. G. Apex of abdomen of female, lateral view. H. Genital region of female, seen from behind. I. Genital region of female, ventral aspect. J. Gonocoxite with gonapophysis. K. Last tergites of female, as seen on slide mount. L. Setae of sixth tergite. M. Syngonapophysis.

casionally with one or two spiniform setae at sides of stridulatory sulcus.

Structure and chaetotaxy of legs as given in generic description and shown in figure 123B–I, K–P. Fore coxa as long as pronotum in lateral view. Fore femur twice as long as coxa, eight times as long as maximum width. Posterior femora surpassing apex of abdomen by 2 mm.

Shape of abdomen of male as shown in figure 123C; that of female similar. Connexival margins slightly lobulate. First tergite tuberculate in middle.

Male and female genitalia as given in generic description and shown in figure 124A–M.

MATERIAL EXAMINED: Hawaii: Kauai: Ala Kai Swamp trail, Kawaikoi Ridge, Kokee, August 18, 1961, beaten from tree-fern fronds (R. L. Usinger; Bernice P. Bishop Museum), one male holotype, one female allotype; (R. L. Usinger; collection Usinger), one female paratype; [R. L. Usinger; British Museum (Natural History)], one female paratype; (R. L. Usinger), one last-instar nymph; Kauai: Kawaikoi, stream, August 16, 1961, beating three ferns (R. L. Usinger; the American Museum of Natural History), one male paratype; (R. L. Usinger), one nymph; same locality, August 17, 1961 (R. L. Usinger), two nymphs.

The above-mentioned nymphs agree in all essential characters with the adults.

OBSERVATIONS: This new species is named for its collector, R. L. Usinger, as a small token of acknowledgment of his generous assistance in the preparation of the present study. *Saicella usingeri* differs from *S. smithi* by the characters mentioned in the key. Once the male of *smithi* can be examined, additional differences are likely to be found.

SEPIMESOS, NEW GENUS

DESCRIPTION: Macropterous male (female unknown): Small species (4.5 mm.).

Body surface partly dull, partly shining, with short and long hairs and with short, adpressed, wool-like pile on parts of head, thorax, and basal abdominal segment. General color white to stramineous; body and appendages, including hind wing, with conspicuous pattern elements.

Head short; anteocular much shorter than postocular region, latter rounded behind in dorsal and lateral aspects, anteocular strongly convex above. Eyes large. Rostrum conspicuously bent between first and second segments; first slender, second subcylindrical, about half as long as first; third somewhat longer than second. Antennae inserted at anterior border of head. First segment of antennae with long hairs. Interocular furrow situated behind level of center of eyes, backwardly curved, but not surpassing level of posterior margin of eyes.

Pronotum completely covering mesonotum, faintly constricted before middle. Fore lobe wider than long, with a punctiform depression posteriorly at center of disc. Hind lobe approximately as long as wide, its sides slightly divergent posteriorly. Scutellum and metanotum lacking spine or process. First abdominal segment somewhat elevated above at center but not spined.

Forelegs stout. Coxa and trochanter simple. Femur with two series of processes. Posteroventral series beginning almost at base of article, composed of about five larger and numerous smaller spines inserted on short or very short bases; large spines combined with their bases much shorter than diameter of article. Anteroventral beginning very slightly distad of posteroventral series, not interrupted at base, similar in structure to posteroventral series but spines smaller. Tibia two-thirds as long as femur, ventrally with two series of strong, curved setae. Tarsi two-segmented, basal much shorter than apical segment. Tarsus one-third as long as tibia, not strongly chitinized, hairy on all surfaces. Claws subequal in size, inner one with medially incised ventral lamella, outer one with two small, pointed, subbasal processes. Mid and hind legs rather short, posterior femora not surpassing apex of forewings. Femora of mid and hind legs with setae of uniform type. Claws slender, faintly curved, with very low, medially incised, ventral lamella.

Forewings heavily wrinkled and embossed. Discal cell large, truncate apically and basally; its basal external angle connected to costal margin by a short, oblique, cross vein; portion of Cu closing discal cell simply curved. M and Cu separated basad of cell; M short, free, Cu attaining axillary region. Pterostigma very narrow, remote from apex of

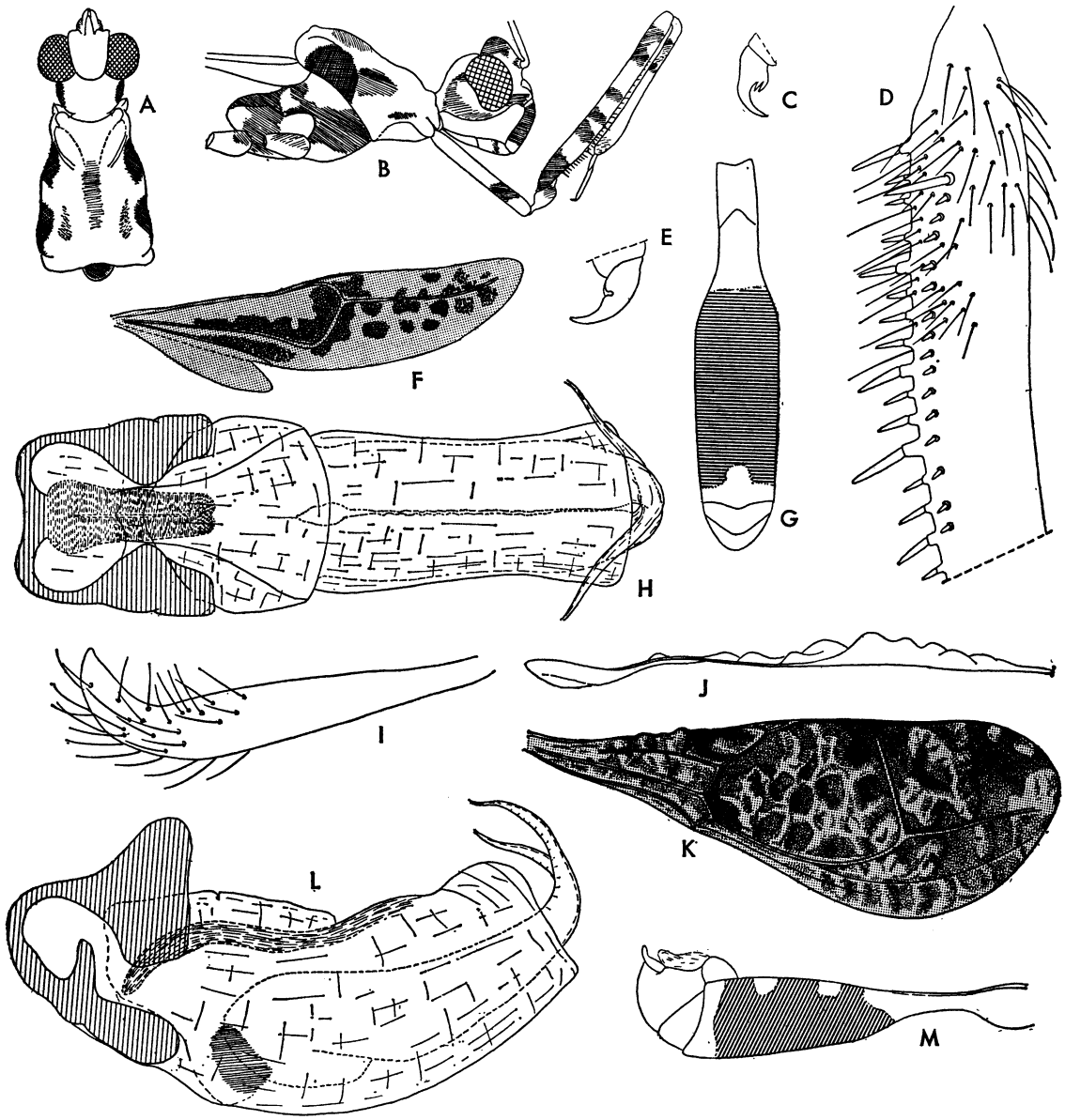


FIG. 125. *Sepimesos alexanderi*, male. A. Head and prothorax, seen from above, with color pattern. B. Anterior portion of body, with color pattern. C. Outer claw of foreleg. D. Base of fore femur. E. Inner claw of foreleg. F. Hind wing, with color pattern. G. Abdomen, from below, with color pattern. H. Phallus, dorsal aspect. I. Paramere. J. Profile of forewing. K. Forewing, with color pattern and sculpture. L. Phallus, lateral view. M. Abdomen, with color pattern, lateral aspect.

wing. Hind wings well developed, but venation reduced: hamus absent, and a single vein apicad of cross vein; anal lobe shorter than half of length of wing.

Abdomen rather short; narrowed and conspicuously constricted shortly beyond base, widest on posterior third. Hind border of basal sternite deeply incised.

Seventh tergite short, not projecting much beyond base of genital segments. Eighth sternite well developed, its spiracle not projecting. Pygophore occupying about one-fifth of total length of abdomen, about as long as high in lateral view. Posterior process spinelike. Parameres short, rodlike, somewhat bent apically, with simple setae. Articulatory apparatus short, capitate processes very large. Basal plate struts fused on their entire length, forming rodlike sclerite adhering to dorsal wall of phallotheca. Latter short, irregularly cylindrical, lacking projections, almost completely membranous. Vesica arms simple in structure, tubular, narrowed apically.

TYPE SPECIES: *Sepomesis alexanderi*, new species.

ETYMOLOGY: Anagram of *Emesopsis*, a genus of the Emesinae.

DISTRIBUTION: Madagascar.

OBSERVATIONS: This peculiar genus seems to be related to the Papuan *Mesosepis* described above. It is clearly more specialized, as shown by the structure and venation of the fore and hind wings. *Hybomatocoris* from Chile is possibly a closely related, but in some respects even more specialized, genus, though it differs by the possession of a scutellar spine, which is lacking in *Sepimesos* and *Mesosepis*.

Sepimesos alexanderi, new species

Figures 6J; 125A–M

DESCRIPTION: Male: Length of apex of forewings, 4.5 mm.

Color of head piceous, with dense white pile on various regions as shown in figure 125B. Rostrum whitish, with basal four-fifths of first and a narrow annulus on basal half of second segment piceous. First segment of antennae white, with a narrow basal, subbasal, and subapical annulus piceous. Pronotum white, with light to dark brown pattern as shown in figure 125A, B. Mesopleura and metapleura and sterna piceous, with dense white pile forming various patches, as shown in figure 125B. Scutellum and metanotum piceous, posterior border of scutellum whitish. Legs whitish. Coxa of foreleg with one broad, subapical dark annulus; trochanter dark on apical half; femur with one broad basal, and one subapical, annulus, and several narrower annuli on median region; tibia with one faint subbasal and one apical annulus. Tarsus light-colored. Coxae of mid and hind legs white, darkened basally; femora with three narrow, equidistant dark annuli, one submedian, one subapical, and one intermediate. Tibiae with one subbasal brown annulus and trace of a second. Forewings whitish hyaline, with numerous irregular spots of brownish to blackish color (fig. 125K). Hind wings whitish hyaline, with brownish spots (shown too dark in fig. 125F). Abdomen white, its median portion dark piceous (fig. 125M), less intense on dorsal surface.

Body and appendages moderately shining, with exception of dull posterior lobe of pronotum. Long hairs in moderate number on ventral surface of head, antennae, legs, and posterior segments of abdomen; rest of body with short pile, wool-like on parts of head and thorax and on first abdominal sternite.

Head as shown in figure 125A, B; fore lobe very strongly elevated. Eyes large; distance between them dorsally slightly less than their width; in lateral view, eyes almost attaining level of ventral surface of head. Rostrum as shown in figure 125B. Hairs of first segment of antennae rather sparse, several times as long as diameter of segment. Length of first segment, 2.4 mm.; others not preserved.

Pronotum as shown in figure 125A, B, rather flattened above. Fore lobe covered with short, wool-like pile, with exception of 1+1 diagonal sublateral areas; hind lobe glabrous, minutely wrinkled. Scutellum short, subsemicircular. Metanotum flattened, subsemicircular.

Forelegs as given in generic description and shown in figure 125B–E. Coxa somewhat shorter than pronotum. Larger spines of ventral surface of femur about half as long as diameter of segment. Posteroventral series composed of about five larger spines, all situated on basal half of segment, and about 16 smaller ones. Anteroventral series com-

posed of one large basal spine and about 50 almost uniform-sized, smaller ones. Larger spines slightly more strongly sclerotized than small ones. Mid and hind legs as given in generic description; hind femora not surpassing apex of forewings.

Shape and venation of forewings as shown in figure 125K, L, characterized by extremely narrow pterostigma and very irregular surface, elevated portions generally corresponding to unpigmented areas, highest boss on area basad of discal cell, between M and costal margin. Whole surface of fore and also of hind wing microscopically honeycombed. Length of forewings, 3.25 mm., surpassing apex of abdomen by 1.6 mm. Length of hind wings, 2.5 mm., surpassing abdomen by 0.25 mm., their shape and venation as given in generic description and shown in figure 125F.

Abdomen strongly constricted at base, rather abruptly widened beyond basal third, then sides subparallel (figs. 125G, M). Genital region as shown in figure 125G, M. Posterior process of pygophore spinelike, pointed apically, somewhat broader at base. Phallus as given in generic description and shown in figure 125H, L; phallotheca laterally near base with 1+1 small sclerotized areas.

MATERIAL EXAMINED: Madagascar: Roger District, January, 1947, 800 meters (Lambeston; the California Academy of Sciences, *ex* collection Alexander), one male holotype.

OBSERVATIONS: This specimen was received from Dr. Charles P. Alexander, for whom the species is gratefully named.

TRIDEMULA HORVÁTH

Tridemula HORVÁTH, 1914a, p. 645.

Empicoris (*Tridemula*): MCATEE AND MALLOCH, 1923, p. 163.

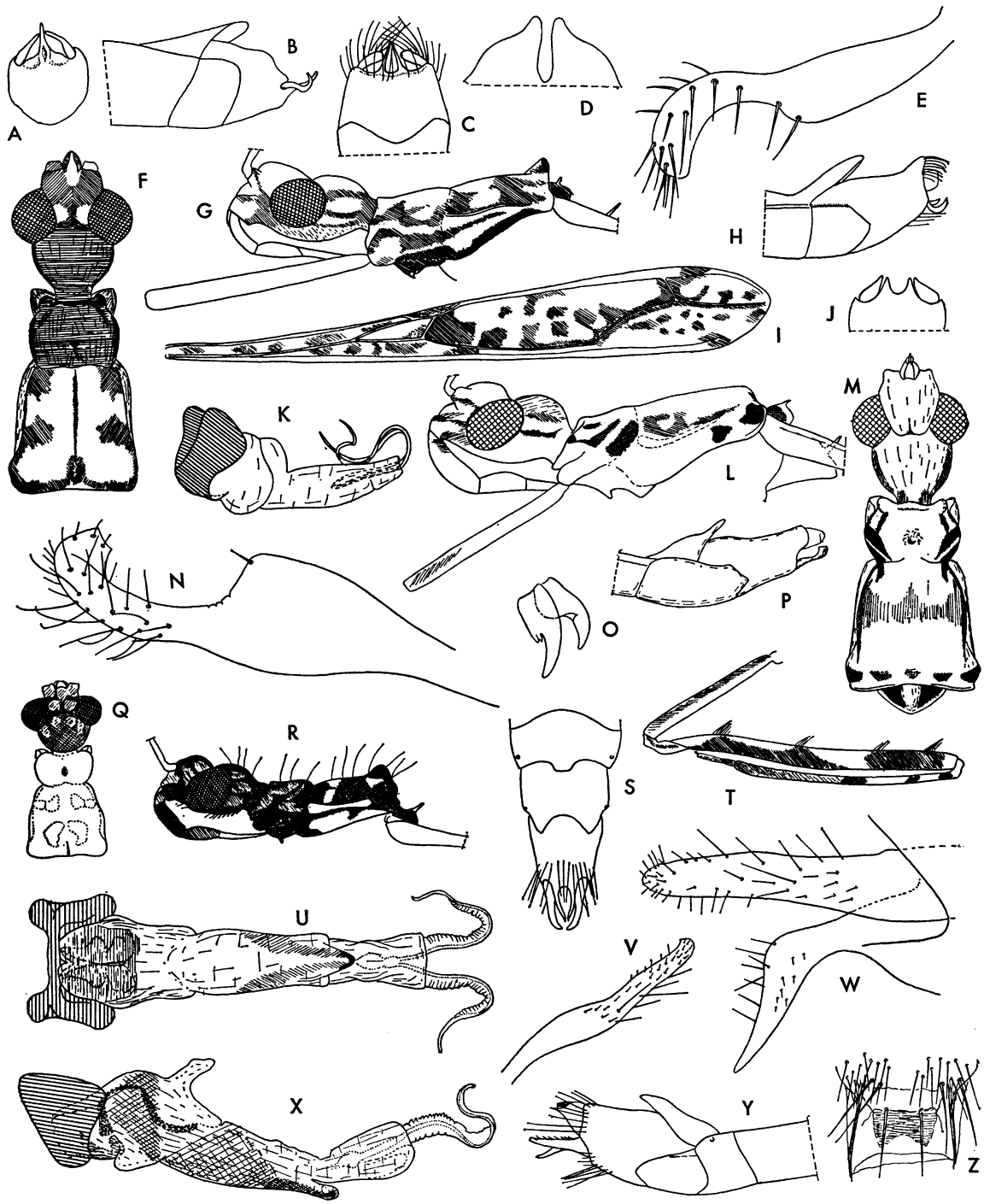
DESCRIPTION: Macropterous. Small species (6–7 mm.).

Body surface dull to shining, rarely partly polished, with short and long hairs, but lacking adpressed, wool-like pile. Basic color whitish to stramineous, legs and antennae sparsely, if at all, annulated with dark; head, thorax, and forewings with conspicuous dark pattern elements, those of forewings composed of irregularly shaped spots.

Head short, anteocular and postocular regions of identical length, both somewhat elevated dorsally. Anteocular with sides subparallel in dorsal view, postocular subsemiglobular in dorsal and lateral views. Eyes large. Rostrum conspicuously bent between first and second segments; first stout, second slightly shorter and somewhat more slender than first, third slightly longer than second. Antenniferous tubercles large; antennae inserted near anterior border of head. First segment of antennae of male and frequently also of female with long hairs. Interocular furrow situated somewhat before, or at level of, center of eyes. Dorsal surface of head often with isolated long hairs.

Pronotum completely covering mesonotum, distinctly constricted before middle; lateral carina present on hind lobe. Fore lobe as wide as, or wider than, long, its sides more or less distinctly rounded; disc posteriorly at center with punctiform or oval depression; surface smooth, dull to slightly shining, rarely polished. Posterior lobe about as wide as long, its sides distinctly diverging posteriorly, its surface smooth, from dull to slightly shining or rarely polished. Center of hind lobe frequently tuberculate before posterior margin. Scutellum and metanotum each with a short or long spine. First abdominal tergite lacking spine. Pronotum generally with scattered long hairs.

Forelegs from stout to slender, with scattered long hairs, those on dorsal surface of femur forming frequently one to four tufts. Femur slightly but distinctly S-shaped; with two series of processes. Posteroventral series beginning near but not at base of article, composed of seven to 10 larger and numerous smaller spines inserted on very short bases; large spines with their bases much shorter than diameter of segment. Anteroventral beginning somewhat distad of posteroventral series, not interrupted at base, similar in composition to latter series. Fore tibia slender, about four-fifths as long as femur, ventrally with two series of strong, decurved setae. Fore tarsus about one-sixth as long as tibia, two-segmented, first segment shorter than second, not heavily chitinized, hairy on all surfaces, bristles on ventral surface rather stiff, those of basal segment elongate, those of apical segment very short, almost spinelike. Claws subequal in size, inner one with medially incised, ventral lamella, outer one with two small, pointed, subbasal projections.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z

Mid and hind legs slender, posterior femora distinctly surpassing apex of abdomen. Femora and tibiae with microchaetae and macrochaetae. Segments of tarsi subequal in size, all with not very numerous long setae, some of those on ventral surface of third segment widened apically. Claws slender, curved, ventrally with low, medially incised lamella.

Surface of forewings smooth; a large discal and a small subbasal cell present. Discal cell subtruncate apically and basally; subbasal cell pointed toward base of wing. A short vein connecting subbasal cell to costal margin of wing. Pterostigma carried virtually to apex of forewing. Hind wing with venation complete; R+M and Cu not connected beyond cross vein, simple.

Abdomen elongate, narrowest just beyond base, widest at posterior third; not conspicuously constricted at base. Hind margin of basal sternite deeply incised. Surface of abdomen smooth, with numerous short and scattered long setae. Proctiger in some cases with conspicuous sclerotized regions and specialized setae.

Male: Seventh tergite medium-sized, projecting over part of genitalia. Eighth sternite very large, covering considerable portion of pygophore from below; its spiracle not projecting. Pygophore small, not more than one-seventh of total length of abdomen, slightly to distinctly longer than high in lateral aspect; sclerotized dorsally for most of its extension, posterior margin with several rows of conspicuous strong setae. Process situated at inferoposterior border of pygophore, from narrowly pointed to bifid. Parameres inserted at inferoposterior border of pygophore, from rod- to sickle-shaped, generally swollen on basal half, apical portion more or less curved. Articulatory apparatus subquadrate. Phallotheca irregularly shaped, entirely membranous or partly sclerotized. Basal plate struts well developed, separate on basal and fused on apical half. Basal portion of vesica arms widened, with transverse folds, apical portion narrowed, short to very elongate, membranous to distinctly sclerotized.

Female: Eighth and ninth tergites small, limited to dorsal portion of genital region only. Gonocoxites very large, covering most of lateral and ventral surface of genital region. Gonapophyses small but well developed. Syngonapophysis transverse, partly sclerotized and with several setae (in *pilosa*, the only species examined for this character).

TYPE SPECIES: *Tridemula pilosa* Horváth (by original designation).

DISTRIBUTION: Oriental and Australian regions.

OBSERVATIONS: This genus is probably most closely related to the group formed by *Ademula*, *Malacopus*, and *Panamia*. The presence of a basal discal cell and a two-segmented fore tarsus is sufficient to distinguish *Tridemula*.

KEY TO THE SPECIES OF *Tridemula*

1. Fore femora dorsally with two to four distinct tufts of dark bristles (figs. 126T; 127C) . . 2
   Fore femora at most with one indistinct tuft at base 6
2. Hind lobe of pronotum tuberculate at middle before hind border (figs. 126R; 127B) . . 3
   Hind lobe of pronotum lacking tubercle . . . . . *pallida*
3. Tubercle of center of hind border of pronotum blackish 4

FIG. 126 (OPPOSITE PAGE). A, B. *Tridemula babayana*, male. A. Pygophore, seen from behind. B. Apex of abdomen, lateral view. C. *Tridemula calamine*, pygophore, inferoposterior view. D–I. *Tridemula contumax*. D. Posterior process of pygophore. E. Paramere. F. Head and prothorax, dorsal view, with color pattern. G. Anterior portion of body, side view; color pattern not shown on fore coxa. H. Genital region of male, lateral view. I. Forewing, with color pattern. J. *Tridemula mixta*, apex of pygophore, posterior view. K. *Tridemula contumax*, phallus, lateral view. L–P. *Tridemula metabates*, male. L. Anterior portion of body, lateral view, with color pattern. M. Anterior portion of body, dorsal view, with color pattern. N. Paramere. O. Claws of foreleg. P. Genital region, lateral view. Q–Z. *Tridemula maai*, male. Q. Head and prothorax, dorsal view, with color pattern. R. Anterior portion of body, lateral aspect, with color pattern. S. Apex of abdomen, seen from below. T. Foreleg, with color pattern; spines not shown. U. Phallus, dorsal view. V. Paramere. W. Posterior portion of pygophore with paramere, lateral view, high magnification. X. Phallus, lateral view. Y. Apical portion of abdomen, lateral aspect. Z. Proctiger.

Tubercle of center of hind border of pronotum whitish 5

4. Lateral portion of hind lobe of pronotum extensively white below carina (fig. 126R); process of pygophore of male bifid (fig. 126S) . . . . . *maai*

Lateral portion of pronotum mostly dark below carina (fig. 127B); process of pygophore of male simple, pointed (fig. 127N) . . . . . *pilosa*

5. Base of fore femur dark; second rostral segment whitish; concavity included by processes of pygophore about as wide as length of processes (fig. 126J) . . . . . *mixta*

Base of fore femur pale; second rostral segment black; concavity included by processes of pygophore much narrower than length of processes . . . . . *plurima*

6. Pronotum strongly polished; process of pygophore of male spiniform (fig. 126A) . . . . . *babayana*

Pronotum not strongly polished; process of pygophore of male bifid (fig. 126C, D). . 7

7. Hind lobe of pronotum rather uniformly light orange-brown, with 1+1 faint, longitudinal, whitish bands . . . . . *calamine*

Hind lobe of pronotum whitish, with striking dark pattern (fig. 126F, M) 8

8. Hind margin of pronotum at center with a distinct dark tubercle; color pattern of head and pronotum as shown in figure 126F, G . . . . . *contumax*

Hind margin of pronotum lacking tubercle; color pattern of head and pronotum as shown in figure 126L, M . . . *metabates*

Tridemula babayana (Distant) new combination

Figures 126A, B

Ploiariola babayana DISTANT, 1920, p. 158.

The genital region of the male is illustrated.

This species is distinguished by the polished surface of its pronotum. A very similar undescribed species occurs in the Fiji Islands, differing from *babayana* in color characters; the phalli have not been compared. The dark annulus of the mid and hind femora is virtually apical in *babayana*, and distinctly subapical in the Fiji species; *babayana* lacks additional annuli on the mid and hind femora, and the first segment of its antennae is entirely pale; in the Fiji species, two additional annuli are found on each femur, and the first antennal segment possesses a dark subapical ring.

MATERIAL EXAMINED: *New Caledonia*: Bâ Bay, December 12, 1914 (P. D. Montague), one specimen. *New Hebrides*: Aneityum, October, 1930 [L. E. Cheesman; British Museum (Natural History)], one male; Erromanga, July, 1930 [L. E. Cheesman; British Museum (Natural History)], one female.

DISTRIBUTION: New Guinea; New Caledonia; New Hebrides.

TYPE: British Museum (Natural History).

Tridemula calamine (Kirkaldy)

Figure 126C

Ploiariodes calamine KIRKALDY, 1908b, p. 372.
Tridemula calamine: MCATEE AND MALLOCH, 1923, p. 163.
Empicoris calamine: CHINA, 1930, p. 148.
Ademula calamine: USINGER, 1946, p. 45.

In addition to the characters mentioned in the key, this species is distinguished by the two long and slender converging processes of the pygophore (fig. 126C).

MATERIAL EXAMINED: Fiji: Viti Levu: Rdg. [?Ridge] west of Vatuthera, September 8, 1938, beating shrubbery, 2600–3000 feet (Zimmerman; Bernice P. Bishop Museum), one male; Viti Levu: Navai Mill, near Nandarivatu, September 17, 1938, beating shrubbery, 2700 feet (Zimmerman; Bernice P. Bishop Museum), one female; (Zimmerman; the American Museum of Natural History), one female; Viti Levu: Lami Quarry near Suva, August 24, 1938, beating shrubs, 10–250 feet (Zimmerman; Bernice P. Bishop Museum), one female. In addition to these specimens, another one has been examined which apparently belongs to the type series: Viti Levu: Rewa, 1905 (Muir; Bernice P. Bishop Museum).

DISTRIBUTION: Fiji Islands.

TYPE: Female, Bernice P. Bishop Museum.

Tridemula contumax Wygodzinsky and Usinger

Figure 126D–I, K

Tridemula contumax WYGODZINSKY AND USINGER, 1960, p. 260, figs. 15a–15l.

A few of the original illustrations are reproduced here.

DISTRIBUTION: Caroline Islands.

TYPE: Male, United States National Museum.

Tridemula maai, new species

Figure 126Q–Z

DESCRIPTION: Male: Length, 6 mm.

General color castaneous to fuscous; pattern elements whitish. Color pattern of head as shown in figure 126Q, R. First rostral segment fuscous, its base narrowly white; second segment stramineous, third white. Antennae whitish. Thorax castaneous above, fuscous laterally and ventrally. Color pattern of pronotum as shown in figure 126Q, R; spots of fore lobe rather faint. Projection of center of hind lobe dark. Scutellum and metanotum dark, their spines whitish. Color pattern of forelegs as shown in figure 126T. Mid and hind legs whitish, femur with three small dark spots, one subapical and two widely spaced submedian ones. Tibiae in some cases with a faint subbasal spot. Color pattern of forewings like that in *pilosa* (see fig. 127P), but basal discal cell more extensively darkened. Abdomen uniformly castaneous; process of pygophore and parameres whitish.

Body surface dull; rostrum, legs, and lateral portions of pronotum shining. Head, body, and appendages with sparse, short hairs; head and thorax with isolated patches of adpressed, silvery pubescence.

Shape of head and rostrum as shown in figure 126Q, R; dorsally and ventrally with isolated long hairs. Eyes large, attaining level of dorsal and ventral surface of head; their distance dorsally slightly less than their width. First segment of antennae witn numerous long hairs; its length 4 mm.; relative length of segments, 1/0.97/0.31/0.15.

Thorax as given in generic description and shown in figure 126Q, R, with scattered long hairs dorsally and ventrally; a well-developed, laterally compressed elevation at center before hind border. Spines of scutellum and metanotum short.

Forelegs as given in generic description and shown in figure 126T. Coxa of forelegs slightly shorter than pronotum, with long hairs on all surfaces. Femur about 11 times as long as maximum width, dorsally with isolated long hairs and four distinct bristle tufts, basal and apical one largest. Structure and chaetotaxy of femur, tibia, and tarsus like those of *pilosa* (see fig. 127E–G). Posterior femur surpassing apex of forewings by 0.5 mm. Basal half of mid and hind femur with long, erect hairs, rest of femora and tibiae with short bristles only.

Forewings surpassing apex of abdomen by 0.3 mm., their shape and venation much as in *pilosa* (see fig. 127P). Hind wings like those of *pilosa*.

Genital region as shown in figure 126S–Y. Seventh sternite salient in middle behind; posterior border of eighth sternite deeply emarginated. Posterior process of pygophore somewhat bent downward, consisting of two slender processes, widely separated at base, converging toward apex. Parameres rodlike, swollen at base, narrowed and subparallel on apical half, their chaetotaxy as shown in figure 126V, W. Proctiger as shown in figure 126Z. Phallus as shown in figure 126U, X. Phallotheca irregularly shaped, with a conspicuous projection dorsally at base and ventrally before apex. Vesica arms membranous, their apical narrowed portion short (broken off?).

MATERIAL EXAMINED: New Guinea: Papua: Brown River, August 30, 1959 (T. C. Maa; Bernice P. Bishop Museum), one male; Papua: Aroa Estate, west of Redscar Bay, September 30, 1958, 1 meter (J. L. Gressitt; the American Museum of Natural History), one male paratype.

OBSERVATIONS: This species, named for T. C. Maa in acknowledgment of his work on the Pacific Hemiptera, is closely related to *T. pilosa*, from which it differs, in addition to the characters indicated in the key, by the very distinctive male genitalia, as shown in the respective figures.

Tridemula metabates Wygodzinsky

Figure 126L–P

Tridemula metabates WYGODZINSKY, 1956, p. 211, figs. 121–132.

This is the only described Australian species. An undescribed species from northern Queensland is before me.

A few of the characters of *metabates* are illustrated here.

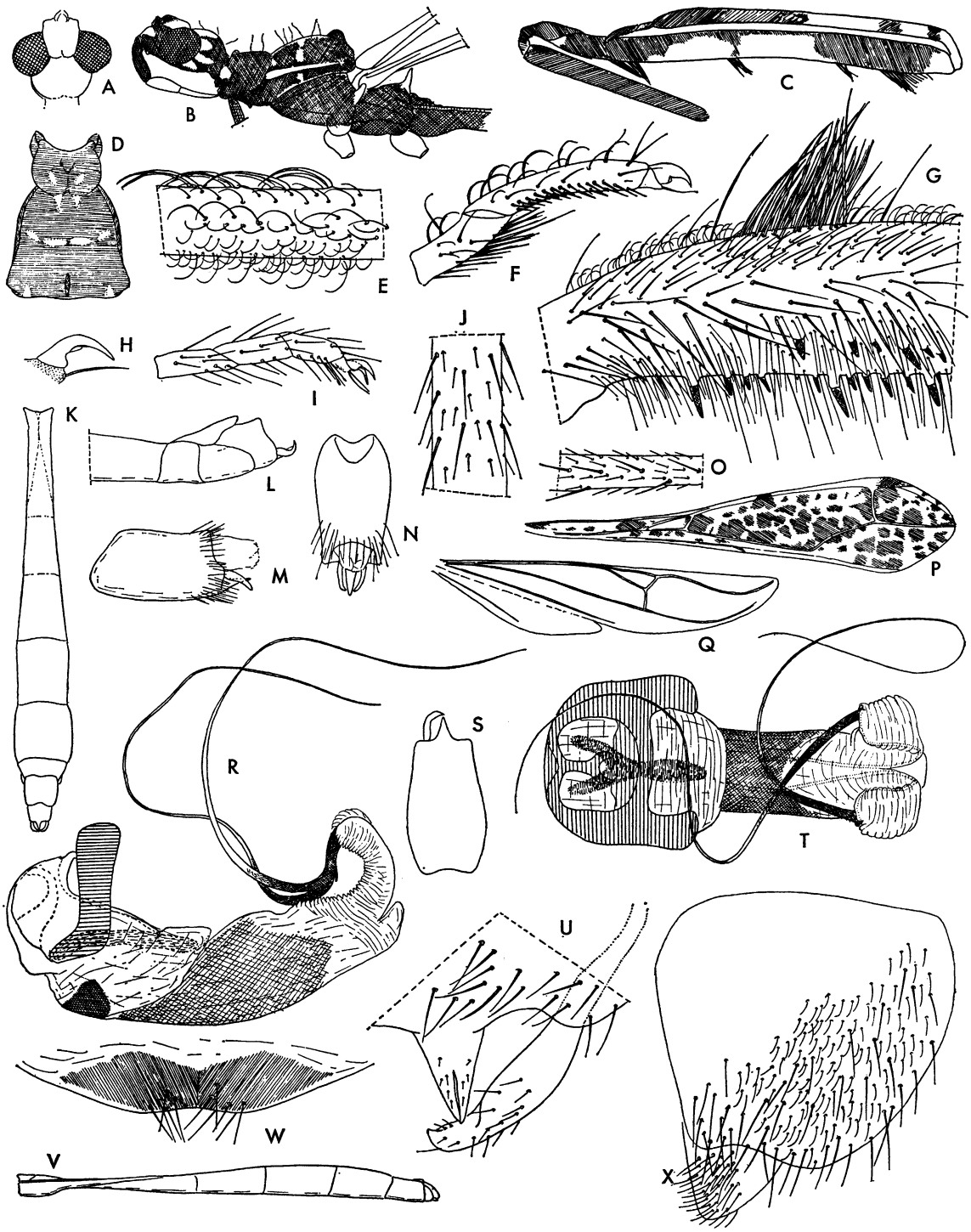
DISTRIBUTION: Australia (Queensland; Lord Howe Island).

TYPE: Male, British Museum (Natural History).

Tridemula mixta (Distant)

Figure 126J

Ploiariola mixta DISTANT, 1909, p. 501.
Tridemula mixta: HORVÁTH, 1914a, p. 647.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X

This species, illustrated by Distant (1910), approaches *plurima* McAtee and Malloch. The main differential characters are given in the key, and the aspect of the posterior portion of the pygophore is here figured.

MATERIAL EXAMINED: Ceylon: Haligala, March, 1907 [British Museum (Natural History)], one male.

DISTRIBUTION: Ceylon.

TYPE: British Museum (Natural History).

Tridemula pallida McAtee and Malloch

Tridemula pallida MCATEE AND MALLOCH, 1926, p. 128, fig. 28.

DISTRIBUTION: Singapore.

TYPE: Male, United States National Museum.

Tridemula pilosa Horváth

Figure 127A–X

Tridemula pilosa HORVÁTH, 1914a, p. 646, fig. 7.
Tridemula horvathi MCATEE AND MALLOCH, 1923, p. 163 (unnecessary change).

Because this is the type species of *Tridemula*, it is illustrated herein in detail. The illustrations are self-explanatory. However, special attention is called to the structure of the process of the male pygophore, which seems to be a simple spine (fig. 127N, S) but which, under high magnification (fig. 127U), shows a deep cleft.

MATERIAL EXAMINED: *Moluccas*: Amboina, October, 1907 (F. Muir; the California Academy of Sciences), one male, one female. *New Britain:* Gazelle Peninsula, Bainings, Saint Paul's, September 4, 1955 (J. L. Gressitt; Bernice P. Bishop Museum), one male. *New Guinea*: West New Guinea, Vogelkop, Fak Fak, south coast of Bombardi, June 10, 1959, 10-100 meters (T. C. Maa; Bernice P. Bishop Museum), one male; Hollandia, August 24, 1955, 100 meters (J. L. Gressitt; Bernice P. Bishop Museum), one specimen. The type has also been examined.

DISTRIBUTION: New Guinea; Moluccas; New Britain.

TYPE: Female, Hungarian National Museum.

Tridemula plurima McAtee and Malloch

Tridemula plurima MCATEE AND MALLOCH, 1926, p. 127, figs. 26, 27, 29.

MATERIAL EXAMINED: *Philippines*: Luzon: Mt. Makiling (United States National Museum), one female. *Malaya*: Kuala Lumpur, 1936 [British Museum (Natural History)], one female.

DISTRIBUTION: Malaya; Philippines.

TYPE: Male, United States National Museum.

Tridemula sp.

An unidentifiable specimen (a female) was collected in the United States, at Framingham, Massachusetts, November 22, 1941 (Frost; the University of Kansas). There is no doubt that this tropical genus does not naturally occur in the United States, but this record is additional evidence for the dispersal capability of the Emesinae.

PLOIARIOLINI INCERTAE SEDIS

Lutevopsis chilensis Porter

Lutevopsis chilensis PORTER, 1923, p. 505.

To judge from the description, this small-sized (4.5 mm.), conspicuously patterned insect possibly belongs to *Empicoris*, but available evidence is insufficient for definite placement.

DISTRIBUTION: Chile.

TYPE: Unknown.

DELIASTINI VILLIERS

Deliastini VILLIERS, 1949a, p. 274.

FIG. 127 (OPPOSITE PAGE). *Tridemula pilosa*. A. Head of male, dorsal aspect. B. Anterior portion of body, lateral view. C. Foreleg, with color pattern; spines not shown. D. Pronotum, with color pattern. E. Portion of fore tibia. F. Fore tarsus. G. Base of fore femur. H. Claw of hind leg. I. Posterior tarsus. J. Portion of hind femur. K. Abdomen of male, ventral view. L. Apex of abdomen of male, lateral aspect. M. Pygophore, side view. N. Pygophore, seen from above. O. Portion of posterior tibia. P. Forewing, with color pattern. Q. Hind wing. R. Phallus, lateral view. S. Pygophore, ventral aspect. T. Phallus, seen from above. U. Apex of pygophore, with one paramere, as seen on slide mount. V. Abdomen of female, lateral view. W. Syngonapophysis. X. Gonocoxite with gonapophysis.

DESCRIPTION: Small to medium-sized species (6–15 mm.). Concolorous, or with inconspicuous pattern elements. Setae of mid and hind legs and of abdomen not differentiated into microchaetae and macrochaetae.

Head, rostrum, and fore coxae of adult without spines (present on fore coxa of first-instar nymph in one genus).

Eyes of winged form large. Rostrum either not or only slightly bent between first and second segments. Ratio of antennal segments I and III, 1/0.06–0.15.

Winged and apterous forms known. Mesonotum of winged form completely covered by pronotum. Scutellum and metanotum without spines.

Fore trochantera lacking spines. Basal process of posteroventral series of fore femur much larger than any of others, inserted near base of segment. Tibiae half as long as femora, their spines well developed. Fore tarsi large, from two-fifths to six-sevenths as long as tibiae, two-segmented, basal segment as long as or longer than second; all segments strongly sclerotized, virtually bare above and at sides. Claws of forelegs small and stout, unequal in size, larger one with medially incised, ventral lamella; arolia very short. Claws of mid and hind legs slender, with or without medially incised, ventral lamella.

Forewings with two or three cells, viz., discal, subbasal, and basal cell; in some cases basal cell absent. Portion of M limiting discal cell inserted on Sc+R. Apex of discal cell approaching wing tip. Hind wings with hamus and m–cu cross vein well developed. Anal lobe one-half or more than one-half as long as wing, not lobulate apically.

Basal abdominal tergite without spine. Last tergite of male either covering genitalia or not from above. Phallus symmetrical. Phallosoma largely membranous, subcylindrical. Endosoma tubular, with very numerous spinelike or bristle-like processes of various sizes arranged in longitudinal groups or rows. Female genitalia with third gonapophysis fused to form a syngonapophysis, latter not prominent, its posterior border salient or slightly notched at middle. Genital region well sclerotized, often conspicuously sculptured.

Male: Testes compact, subtriangular. Mesadenia with single tubular lobe.

TYPE GENUS: *Palacus* Dohrn (as *Deliastes* Dohrn).

DISTRIBUTION: Neotropical Region.

OBSERVATIONS: The restricted range of this tribe, as well as the small number of genera that belong in it, shows that the Deliastini are a relict taxon. The taxon is considered to be the plesiomorphic component of a group containing the Deliastini and the more specialized Metapterini.

KEY TO THE GENERA OF THE DELIASTINI

1. Forewings with three cells, Pcu cross vein inserted on basal cell (figs. 129I; 130A), or apterous (fig. 128E, F) 2
   Forewings with two cells only, Pcu cross vein inserted on discal cell (fig. 132A). . . . . *Stalemesa*
2. Anteroventral series of fore femur interrupted at base (fig. 129A); fore tarsus half as long as tibia, its two segments of subequal size (fig. 129A, C, R) . . . . . *Bergemesa*
   Anteroventral series of fore femur not interrupted at base, beginning with two spinelike setae (fig. 130C, E); fore tarsus much more than half of length of tibia, its basal segment much longer than apical (fig. 130C) . . . . . *Palacus*

BERGEMESA WYGODZINSKY

Deliastes: BERG, 1884, p. 114 (*nec* Dohrn, 1863).
Bergemesa WYGODZINSKY, 1950d, p. 30.

DESCRIPTION: Macropterous or apterous. Small to medium-sized species (9–15 mm.).

Macropterous male: Body surface subshining, rugose, covered with sparse, very short setae inserted on tiny, wartlike tubercles. Modified setae from pointed to rounded apically. General color stramineous, pattern elements not striking; over-all aspect peppered.

Head relatively short, not compressed dorsoventrally, anteocular region slightly longer than postocular, latter rounded or with sides gradually converging posteriorly in dorsal and lateral views. Eyes medium-sized to large. Interocular furrow at or slightly before level of center of eyes, curved, not attaining level of posterior border of eyes. Rostrum slender, only very slightly bent between first and second segments; first segment as long as, or slightly longer than, half of length of anteocular region, not attaining level of anterior border of eyes; second segment about as long

as first, not or not quite attaining level of posterior border of eyes; third shorter than first and second together. Antennae inserted very near apex of head, remote from anterior border of eyes.

Pronotum completely covering mesonotum, not flattened, faintly to rather strongly constricted at middle, but not pedunculate. Fore lobe subcylindrical, more or less narrowed posteriorly; posterior lobe bell-shaped, varying in proportions, disc of both lobes convex. Scutellum and metanotum short, both with a median longitudinal carina.

Forelegs relatively short, from stout to slender. Femur from almost parallel-sided to distinctly widened toward middle, with two series of spiniform processes, spines short and strongly chitinized. Posteroventral series beginning near but not at base of article, composed of one large process and several medium-sized and numerous small processes, in some cases but not in all transformed into short teeth on apical portion of femur. Anteroventral series beginning slightly apicad of basal process of posteroventral series, composed of several medium-sized and many small processes similar to those of posteroventral series, widely interrupted at base, a single process basad of interruption. Tibia stout to slender, half as long as femur, ventrally with one row of adpressed, elongate, spinelike setae. Tarsus half as long as tibia or even shorter, its two segments subequal in size, ventrally with one series of elongate, adpressed, spiniform setae. Outer claw large, inner much smaller but normal in shape; both ventrally with weakly developed, medially incised lamella. Mid and hind legs slender, medium-sized, hind femora slightly surpassing apex of abdomen; femora with uniform short setae. Basal segment of mid and hind tarsi almost as long as second and third combined, latter subequal in size. Claws slender, smoothly curved, ventrally with very well-developed, medially incised lamella, basal portion of lamella more conspicuous than apical.

Forewings with discal, basal, and subbasal cells, discal cell with longitudinal percurrent fold. Pcu cross vein meeting basal cell near apex of latter. Pterostigma somewhat remote from wing tip, its relation to level of apex of discal cell varied. Hamus of hind wings strongly angled toward Sc+R; m-cu cross vein short, obliquely directed toward wing base. R+M and Cu extending beyond level of cross vein to near wing border, simple, not connected.

Abdomen slender, elongate, narrow at base, somewhat widened toward apical third. Spiracles of eighth segment salient. Last tergite tongue-shaped, attaining level of apex of pygophore. Eighth sternite shorter than pygophore, latter subsemicircular in lateral view, not longer than high, its posterosuperior process broad, platelike, pointed or truncate apically. Parameres rod-shaped or slightly widened, curved, with short hairs. Basal plates short, divergent at base, fused on apical half. Phallobase membranous, its wall weakly sclerotized dorsally at apex. Struts separate on basal, fused on apical, half, directed toward upper wall of phallotheca. Endosoma wall with variously shaped bristlelike, spinelike, and tubercle-like projections in large number.

Apterous male: General characters like those of winged form. Pronotum not covering mesonotum, subcylindrical, somewhat constricted on posterior third. Mesonotum somewhat longer than wide, carinate along middle; metanotum subquadrate; both combined about as long as pronotum. Abdomen like that of winged form.

Apterous female: General characters like those of apterous male. Abdomen subcylindrical or physogastrous, viz., pedunculate at base, strongly widened toward posterior third, very convex dorsally and ventrally; often tuberculate at center of hind border of abdominal tergites. Eighth and ninth tergites strongly sclerotized and conspicuously sculptured, eighth much shorter than ninth, both forming continuous, backwardly and somewhat downwardly directed surface. Gonocoxites subcircular, distinctly separated from each other. Gonapophyses well developed, separate. Syngonapophysis distinctly sclerotized and with numerous setae, emarginated apically. Setae of genital appendages not divided into microchaetae and macrochaetae.

TYPE SPECIES: *Deliastes brachmanni* Berg (by original designation).

DISTRIBUTION: Neotropical Region (South America).

OBSERVATIONS: This genus flourishes, in

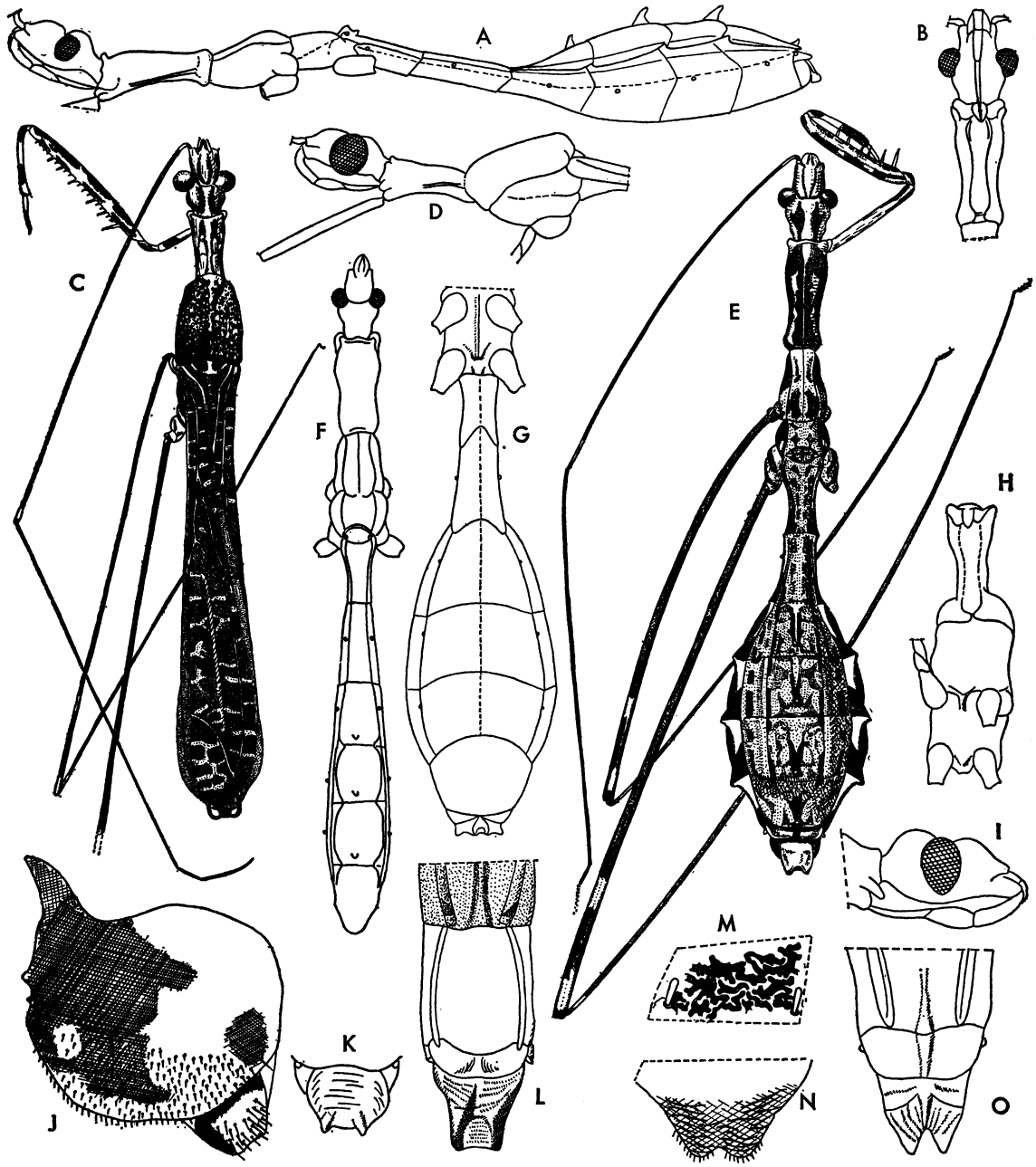


FIG. 128. A–K. *Bergemesa brachmanni*. A. Female, lateral view. B. Head and prothorax of macropterous male, seen from below. C. Macropterous male, general aspect, with color pattern. D. Anterior portion of body of macropterous male, side view. E. Female, general aspect, with color pattern. F. Micropterous male, dorsal view, schematic. G. Metathorax and abdomen of female, seen from below. H. Thorax of macropterous male, ventral view. I. Head of apterous male, lateral aspect. J. Gonocoxite with gonapophysis. K. Ninth tergite of female. L. *Bergemesa pacifica*, female, apical region of abdomen, dorsal view. M, N. *Bergemesa brachmanni*. M. Surface structure of abdomen, high magnification. N. Syngonapophysis. O. *Bergemesa kuscheli*, female, apical region of abdomen, dorsal view.

species as well as in specimens, in the semiarid region of central Argentina. An endemic species is found in equally semiarid central Chile, but one species occurs in the humid regions of the eastern slope of the Andean chain in eastern Peru.

KEY TO THE SPECIES OF *Bergemesa*

1. Males 2
   Females 6
2. Interocular distance dorsally less than width of eye (fig. 128C) 3
   Interocular distance dorsally larger than width of eye 5
3. Median and posterior femora whitish, with two faint, subapical, dark spots or annuli . . . . . *stramineipes*
   Median and posterior femora dark, with a conspicuous apical and a subapical annulus, whitish (fig. 128C) 4
4. Total length, 9 mm.; disc of pygophore dark-colored . . . . . *proseni*
   Total length, 10.5 mm.; disc of pygophore light-colored (fig. 129L) . . . . . *brachmanni*
5. Macropterous; length, 14.5 mm.; head elongate, neck slender (fig. 129R); distance from base of fore femur to insertion of large basal process of posteroventral series equal to length of process (fig. 129R) . . . . . *reedi*
   Apterous; length, 11 mm.; head less elongate (fig. 128I); distance from base of fore femur to insertion of large basal process of posteroventral series much smaller than length of said process (fig. 129A) . . . *brachmanni*
6. Pronotum virtually parallel-sided; posterior abdominal tergites not tuberculate at center behind, hind margin of ninth tergite virtually straight (fig. 128L) . . . . . *pacifica*
   Pronotum distinctly constricted on posterior third; posterior abdominal tergites at center of hind border with a tubercle or spine, last tergite conspicuously incised behind (figs. 128A, E, O; 129S) 7
7. Head not much longer than wide across eyes (ratio of length to width, 1.3) (fig. 128E); fore femur thickened toward middle (fig. 129A); abdomen strongly widened toward middle (fig. 128A, E, G); ninth tergite slightly emarginate behind (fig. 128E, K) . . . . . *brachmanni*
   Head much longer than wide across eyes (ratio of length to width, 2.3); fore femur virtually parallel-sided; abdomen not distinctly widened toward middle; last tergite with a conspicuous incision at posterior border (fig. 128 O) . . . . . *kuscheli*

Bergemesa brachmanni (Berg)

Figures 3C; 6F; 128A–K, M, N; 129A–Q, T, U

Deliastes brachmanni BERG, 1884, p. 114.

Deliastes reticulatus MCATEE AND MALLOCH, 1925, p. 35, figs. 34–36 (*nec* Dohrn, 1863).

Bergemesa brachmanni: WYGODZINSKY, 1950d, p. 33, figs. 1–23, 25–41.

This is the most common species of the genus. A detailed redescription (from which the figures here reproduced are taken) and notes on its biology were given by Wygodzinsky (1950d).

MATERIAL EXAMINED: Bolivia: Cochabamba, October 27, 1950 (Zischka: the American Museum of Natural History), one male, one female.

DISTRIBUTION: Bolivia; Paraguay; Argentina (from Chaco to Río Negro provinces).

TYPE: Male, collection Drake.

Bergemesa kuscheli Wygodzinsky

Figures 128 O; 129S

Bergemesa kuscheli WYGODZINSKY, 1950d, p. 44, figs. 51–55.

DISTRIBUTION: Peru.

TYPE: Female, Instituto Miguel Lillo.

Bergemesa pacifica Wygodzinsky

Figure 128L

Bergemesa pacifica WYGODZINSKY, 1950d, p. 42, figs. 56–58.

MATERIAL EXAMINED: Chile: Santiago: Renca, June, 1953 (collection Peña), one female; Renca, May, 1954 (collection Peña), one nymph.

The original description was based on a headless female from an unknown locality in Chile. The adult specimen that I examined agrees with the type. Its head is shaped like that of *B. kuscheli*.

DISTRIBUTION: Chile.

TYPE: Female, collection Drake.

Bergemesa proseni Wygodzinsky

Bergemesa proseni WYGODZINSKY, 1950d, p. 40, figs. 42–44.

DISTRIBUTION: Argentina (Salta).

TYPE: Male, Instituto Miguel Lillo.

Bergemesa reedi Wygodzinsky

Figure 129R

Bergemesa reedi WYGODZINSKY, 1950d, p. 41, figs. 45–50.

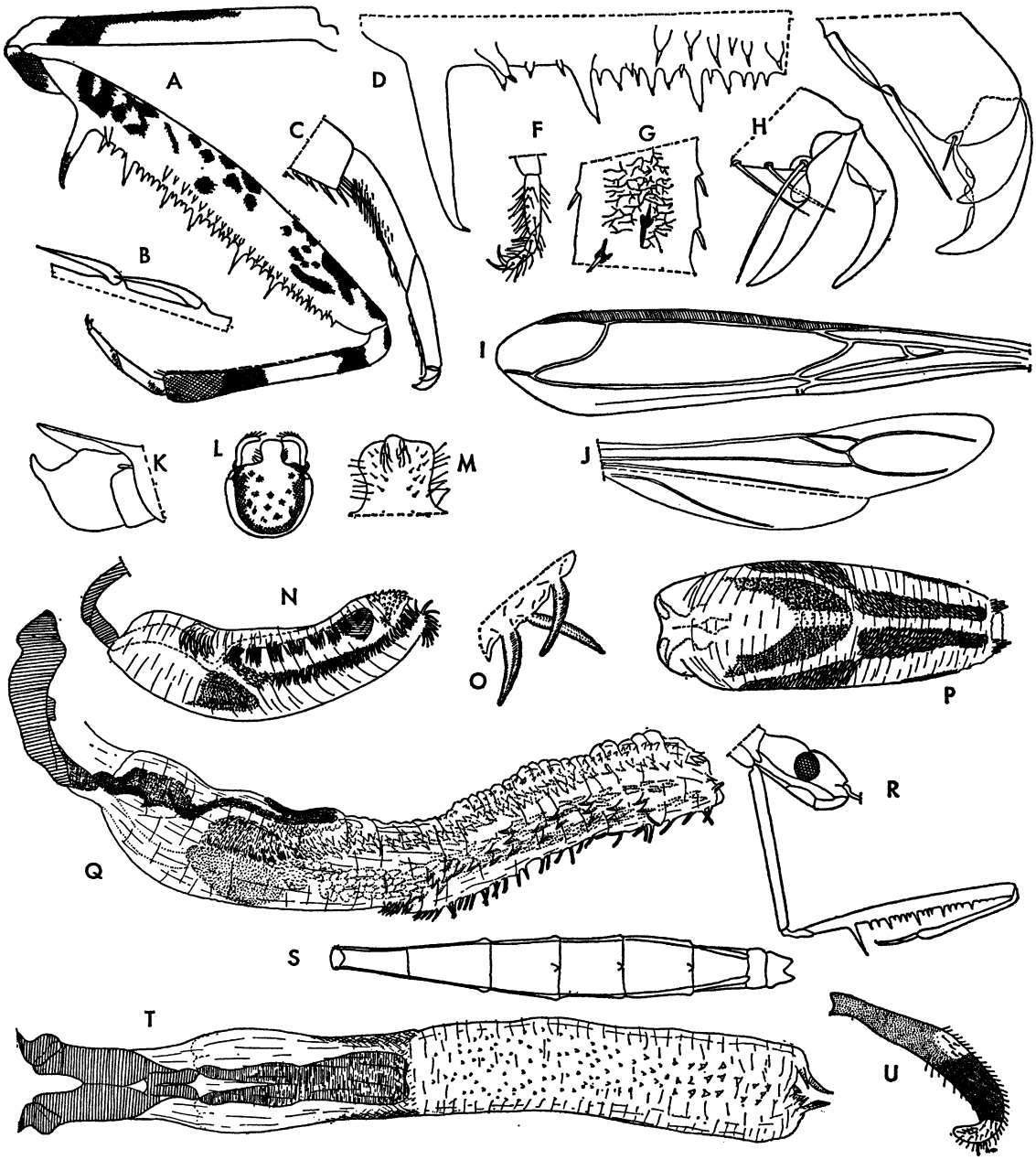


FIG. 129. A–Q. *Bergemesa brachmanni*. A. Foreleg with color pattern. B. Spines of under side of fore tibia. C. Apex of tibia with fore tarsus. D. Base of series of fore femur. E. Apex of fore tarsus with claws. F. Posterior tarsus. G. Portion of hind femur. H. Apex of last tarsal segment, with claw of hind leg. I. Forewing. J. Hind wing. K. Genital region of female, side view. L. Pygophore, seen from behind, with color pattern. M. Process of pygophore, high magnification. N. Phallus, lateral view, endosoma not everted. O. Spines of endosoma. P. Phallosoma, ventral view. Q. Phallosoma, lateral aspect, with endosoma partially everted. R. *Bergemesa reedi*, male, anterior portion of body, lateral view. S. *Bergemesa kuscheli*, female, abdomen, dorsal aspect. T, U. *Bergemesa brachmanni*. T. Phallus, dorsal view, endosoma partially everted. U. Paramere, pigmentation shown.

MATERIAL EXAMINED: Argentina: Río Negro: Lamarque (Fritz; the American Museum of Natural History), one male.

DISTRIBUTION: Argentina (Mendoza, Río Negro).

TYPE: Male, Cornell University.

Bergemesa stramineipes (McAtee and Malloch)

Deliastes stramineipes MCATEE AND MALLOCH, 1925, p. 35, fig. 37.

Bergemesa stramineipes: WYGODZINSKY, 1950d, p. 40.

MATERIAL EXAMINED: Argentina: Córdoba: 5 miles north of Dean Funes, February 8, 1951 (Ross and Michelbacher; the California Academy of Sciences), one male.

DISTRIBUTION: Argentina (Santiago del Estero; Córdoba).

TYPE: Male, Muséum National d'Histoire Naturelle.

PALACUS DOHRN

Palacus DOHRN, 1863, p. 74.

Deliastes DOHRN, 1863, p. 75.

DESCRIPTION: Macropterous. Small species (6–9 mm.).

Body surface subshining, slightly rugose, covered with sparse, very short pile. Modified setae short, pointed to blunt. Body and appendages of rather uniform light to dark color, legs in some cases faintly annulated, forewings concolorous or with irregular pattern.

Head fusiform, compressed dorsoventrally; anteocular portion longer than postocular, latter broadly rounded behind in dorsal view, ventrally with rather conspicuous central salience posterior to level of eyes. Eyes large. Interocular furrow slightly curved only, situated anterior to level of center of eyes. Rostrum slender, slightly bent between first and second segments; first segment shorter than half of anteocular portion of head, second slightly longer than first, reaching to level of anterior border of eyes, third as long as first and second combined. Antennae inserted very near apex of head, remote from anterior border of eyes.

Pronotum completely covering mesonotum, somewhat flattened above, constricted behind middle but not pedunculate. Fore lobe subcylindrical, somewhat longer than wide, on posterior portion with a more or less well-developed, median, longitudinal depression. Hind shorter than fore lobe, its sides subparallel, lacking any conspicuous structures. Scutellum short, rounded posteriorly, with median longitudinal carina, latter also on metanotum.

Forelegs strong and relatively short. Femur somewhat widened toward middle, with two series of strong spines inserted on conspicuous processes or tubercles. Posteroventral series beginning virtually at base of segment with a large spiniferous process, followed by a series of four to five large and very numerous, medium-sized and small spiniferous processes becoming very short toward apex of article. Anteroventral series beginning somewhat apicad of posteroventral series, not interrupted at base, starting with two strong, spinelike setae followed by numerous small and very small spiniferous processes similar to those of posteroventral series. Tibia stout, slightly shorter than half of femur, ventrally with one row of strongly sclerotized, short, curved, apically pointed spines. Tarsus slightly shorter than tibia, both combined not quite so long as femur; basal twice length of apical segment, ventrally with one series of adpressed, elongate, simple, spinelike setae. Claws well developed, unequal in size, outer one larger, ventrally with two weakly developed, short projections. Mid and hind legs relatively short, femora attaining or slightly surpassing apex of abdomen; femora with uniform short setae. First and third segments of mid and hind tarsi subequal in size, second shorter. Claws short, strongly curved, ventrally with weakly developed, medially incised lamella.

Forewings with discal, basal, and subbasal cells, discal cell with percurrent longitudinal fold. Pcu cross vein meeting basal cell near apex of latter. Pterostigma carried very near wing tip, distinctly surpassing level of apex of discal cell. Hamus of hind wings strongly angled toward Sc+R, but almost obsolete. M-cu cross vein perpendicular to longitudinal axis of wing, forming straight line with section of M connecting m-cu to R+M. R+M and Cu extending from level of cross vein to near wing border, not joining; R+M simple; Cu shortly beyond its base with a basally directed vein stump.

Abdomen slender, elongate, slightly widened toward middle.

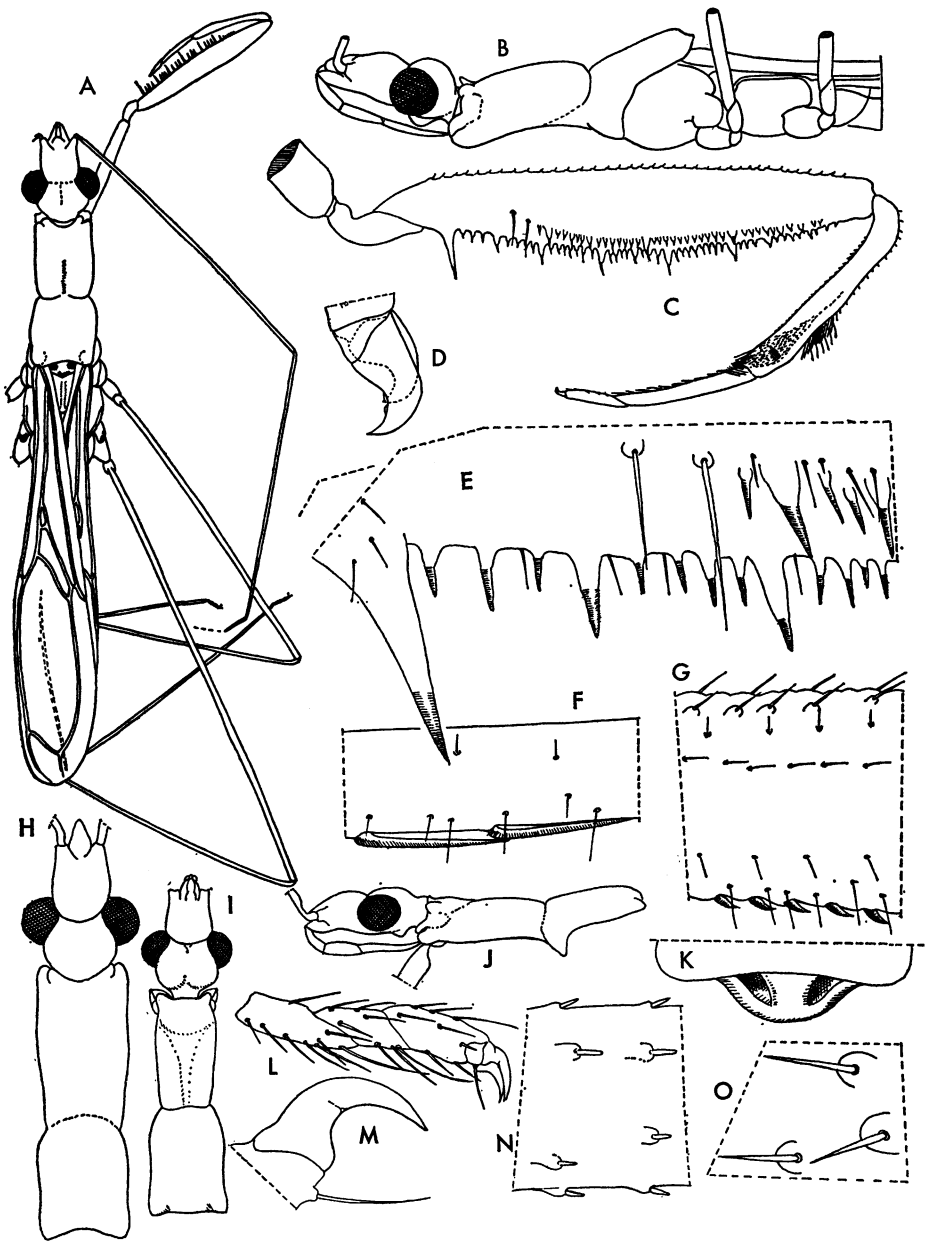


FIG. 130. A–G. *Palacus cubensis*, male. A. General aspect. B. Head and thorax, lateral view. C. Foreleg, only apex of coxa shown. D. Claws of foreleg. E. Base of fore femur. F. Portion of fore tarsus. G. Portion of fore tibia. H. *Palacus reticulatus*, male, head and prothorax, dorsal view. I, J. *Palacus maculatus*, male. I. Head and prothorax, dorsal view. J. Head and prothorax, lateral aspect. K. *Palacus cubensis*, scutellum. L–N. *Palacus maculatus*. L. Posterior tarsus. M. Claw of hind leg. N. Portion of posterior femur. O. *Palacus cubensis*, setae of pygophore.

Male: Last tergite tongue-shaped, almost attaining level of apex of genital segments. Eighth sternite much smaller than pygophore, its spiracles pedunculate. Pygophore longer than wide in lateral view, its anterior dorsal bridge narrow, its posterior border with a triangular upwardly and slightly forwardly directed projection. Parameres slender, strongly curved on apical half, with long setae. Phallotheca membranous, slightly sclerotized ventrally. Basal plate struts directed toward dorsal wall of phallotheca. Endosoma wall with bristle- and tubercle-shaped projections in large numbers.

Female: Genital segments not strongly sclerotized or sculptured. Gonocoxites slightly longer than wide, well separated. Gonapophyses well developed, separated. Syngonapophysis distinctly sclerotized, with numerous setae, salient at center behind. Setae of genital appendages of uniform size.

TYPE SPECIES: Of *Palacus*, *Palacus cubensis* Dohrn (monobasic;) of *Deliastes*, *Deliastes reticulatus* Dohrn (monobasic).

DISTRIBUTION: West Indies.

Wygodzinsky (1950e) has summarized the history of *Palacus*.

KEY TO THE SPECIES OF *Palacus*

1. Color of forewings uniformly dark brown, longitudinal fold of discal cell whitish; pronotum relatively stout (fig. 130A); basal and subbasal cells of forewings relatively short fig. 130A) . . . . . *cubensis*
   Color of forewings different; pronotum relatively slender (fig. 130H, I); basal and subbasal cells of forewing relatively elongate (fig. 131A, C) 2
2. Pattern of forewing irregularly reticulate (fig. 131C) . . . . . *reticulatus*
   Pattern of forewing composed of scattered, light-colored spots on dark ground (fig. 131A) . . . . . *maculatus*

Palacus cubensis Dohrn

Figures 130A–G, K, O; 131B, E, F, K, M

Palacus cubensis DOHRN, 1863, p. 75.

The illustrations of this species in the present paper are taken from the redescription by Wygodzinsky (1950e).

DISTRIBUTION: Cuba; Jamaica.

TYPE: Unknown.

Palacus maculatus, new species

Figures 5G; 130I, J, L–N; 131A, D, G, H, L

Palacus cubensis: BARBER, 1954, p. 13 (*nec* Dohrn, 1863).

DESCRIPTION: Male: Length to apex of forewings, 8.2 mm.

Head, thorax, and abdomen piceous. Abdomen largely fulvous on anterior segments below and on anterior third of tergites, including connexival segments. Antennae piceous; rostrum ochraceous. Forelegs ochraceous, femora with not very distinct piceous annuli at base, middle, and apex. Mid and hind legs fuscous, apex of femora piceous. Forewings fuscous, discal cell and adjacent regions with scattered, small, whitish spots (fig. 131A). Surface of body microscopically tuberculate-rugose, subshining, more distinctly so on abdomen ventrally. Setae on mid and hind femora and abdominal sternites as shown in figure 130N.

Shape of head as given in generic description and shown in figure 130I, J. Distance between eyes dorsally slightly larger than their width; in lateral view, eyes longer than high, not quite attaining level of dorsal or ventral surface of head. Interocular furrow deep; postocular region dorsally distinctly though shallowly sulcate along middle. Antennae very shortly pilose; length of first segment, 4.0; of second, 3.5 mm.

Pronotum as given in generic description and shown in figure 130I, J; fore lobe flattened above, somewhat depressed on disc. Humeri faintly elevated. Scutellum and metanotum as given in generic description.

Forelegs as given in generic description and like those of *cubensis* (see fig. 130D–G). Hind femora attaining but not surpassing apex of abdomen, its setae as shown in figure 130N; tarsus and claws as shown in figure 130L, M.

Structure of fore and hind wings as given in generic description and shown in figure 131A, D.

Abdomen as given in generic description. Aspect of genital region as shown in figure 131H, L; process of pygophore narrowly pointed apically. Shape and chaetotaxy of parameres as shown in figure 131G.

MATERIAL EXAMINED: West Indies: Bahamas: South Bimini Island, July 28, 1951 (C. and P. Vaurie; the American Museum of Natural History), one male holotype, determined by H. G. Barber as *Palacus cubensis* Dohrn.

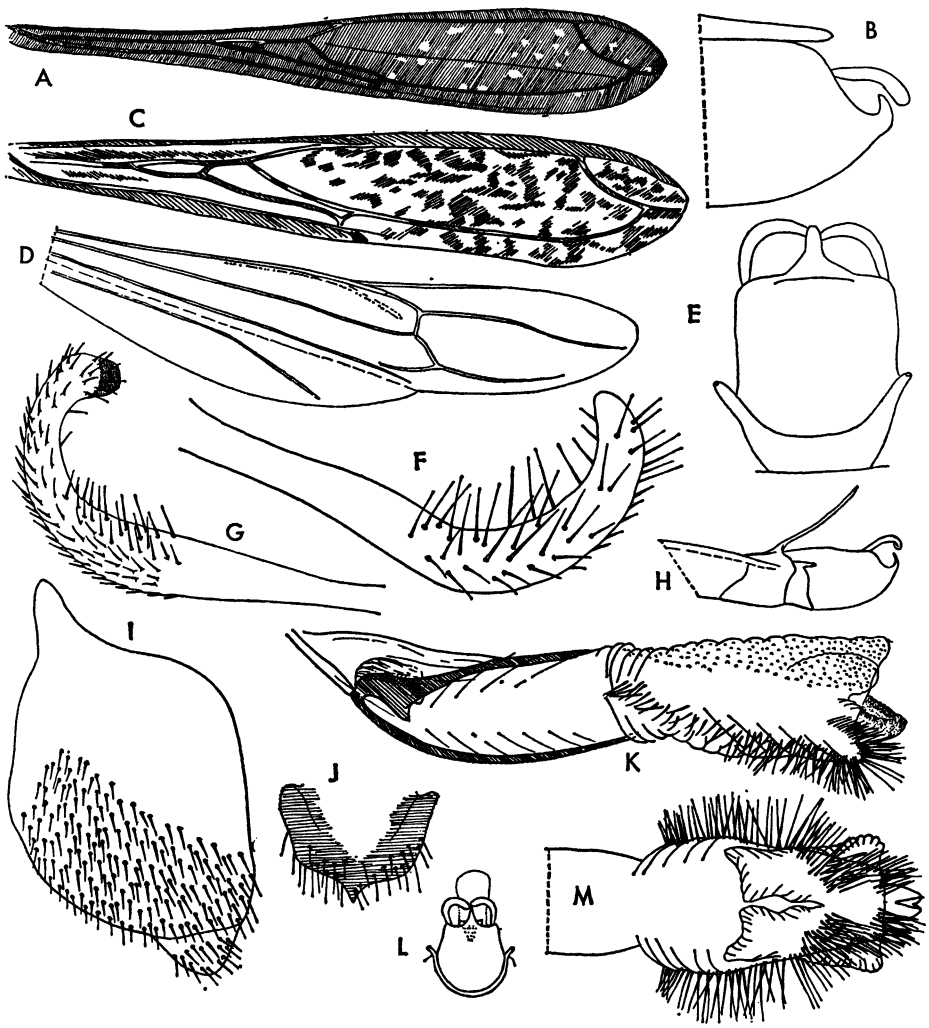


FIG. 131. A. *Palacus maculatus*, forewing, with color pattern. B. *Palacus cubensis*, pygophore, lateral view. C. *Palacus reticulatus*, forewing, with color pattern. D. *Palacus maculatus*, hind wing. E, F. *Palacus cubensis*. E. Pygophore, inferoposterior view. F. Paramere. G, H. *Palacus maculatus*, male. G. Paramere. H. Apex of abdomen, lateral view. I, J. *Palacus reticulatus*, female. I. Gonocoxite with gonapophysis. J. Syngonapophysis. K. *Palacus cubensis*, phallus, lateral view; articulatory apparatus not shown, endosoma partly everted. L. *Palacus maculatus*, pygophore, seen from behind. M. *Palacus cubensis*, endosoma, ventral view.

Palacus maculatus can be distinguished from the two remaining species of the genus by the characters given in the key.

Palacus reticulatus (Dohrn)

Figures 130H; 131C, I, J

Deliastes reticulatus DOHRN, 1863, p. 76.
Palacus reticulatus: WYGODZINSKY, 1950e, p. 108, figs. 18–22.

The figures of *reticulatus* given here are taken from Wygodzinsky (1950e).

DISTRIBUTION: Cuba.

TYPE: Unknown.

STALEMESA, NEW GENUS

DESCRIPTION: Macropterous male: Small species (6 mm.).

Body surface subshining, rugose, covered with sparse, very short pile, abdominal sternites with a few longer bristles near posterior border. Modified setae slender, pointed. General color brownish, lacking conspicuous pattern elements.

Head short, strongly compressed dorsoventrally; anteocular portion hardly longer than postocular, latter broadly rounded behind eyes in dorsal view; ventrally abruptly constricted behind eyes in lateral view. Eyes very large. Interocular furrow only slightly curved, not surpassing level of center of eyes. Rostrum slender, not distinctly bent between first and second segments; first reaching to level of center of anteocular portion, second twice as long as first, attaining level of center of eyes, third about as long as second. Antennae inserted very near apex of head, remote from anterior border of eyes.

Pronotum completely covering mesonotum, somewhat flattened above, only slightly constricted at middle. Fore lobe subcylindrical, somewhat longer than wide, separated from hind lobe by a faint transverse depression. Hind lobe longer than fore lobe, widest at about middle, lacking conspicuous structures. Scutellum short, rounded posteriorly, with a median longitudinal carina; metanotum also carinate along middle.

Forelegs stout and relatively short. Femur widened from base to point of insertion of first spines of posteroventral series, then somewhat constricted and widened again toward middle; narrower toward apex. Basal fifth of segment devoid of processes. Posteroventral series beginning with rather short spine inserted on spiniferous process which is longer than its spine, this process largest of whole series, followed by two or three medium-sized and not very numerous small, spiniferous processes, latter shorter than their spines, which become very short and toothlike on apical portion of segment. Anteroventral series beginning somewhat apicad of posteroventral series, not interrupted at base, starting with two strong, spinelike setae followed by rather irregularly distributed small and very small spines or teeth similar to those of apical portion of posteroventral series. Tibia stout, half as long as femur, ventrally with one row of strongly sclerotized, adpressed, spinelike setae. Tarsus half as long as tibia, its two segments subequal in size, ventrally with a few irregularly arranged, slender, adpressed, spinelike setae. Claws unequal in size, outer one well developed, ventrally with a faint median incision; inner one strongly reduced. Mid and hind legs long and slender, hind femur considerably surpassing apex of abdomen. Femora with uniform setae. First and third segments of hind tarsi subequal in size, second much smaller. Claws moderately curved, apparently completely lacking ventral medially incised lamella or any other specialized structure.

Forewings with dorsal and subbasal cells. Discal cell lacking percurrent longitudinal fold. Pterostigma remote from apex of wing, not attaining level of apex of apical cell. Hamus of hind wings rather strongly angled toward Sc+R; m-cu cross vein obliquely inclined toward wing base; R+M and Cu extending from level of cross vein to near wing border, not meeting; R+M near its base with a faint marginal branch.

Abdomen slender, elongate, its sides subparallel. Spiracles of eighth segment somewhat salient. Last tergite very short, not surpassing base of genital segments. Eighth sternite shorter than pygophore, latter longer than high in lateral view, its dorsal, sclerotized portion occupying most of its surface. Posterior process large, scoop-shaped. apparently arising from ventral border of pygophore. Parameres slender, strongly curved, with long hairs. Basal plates short, divergent at base, fused on apical half. Phallobase membranous, with saddle-shaped, apical, dorsal

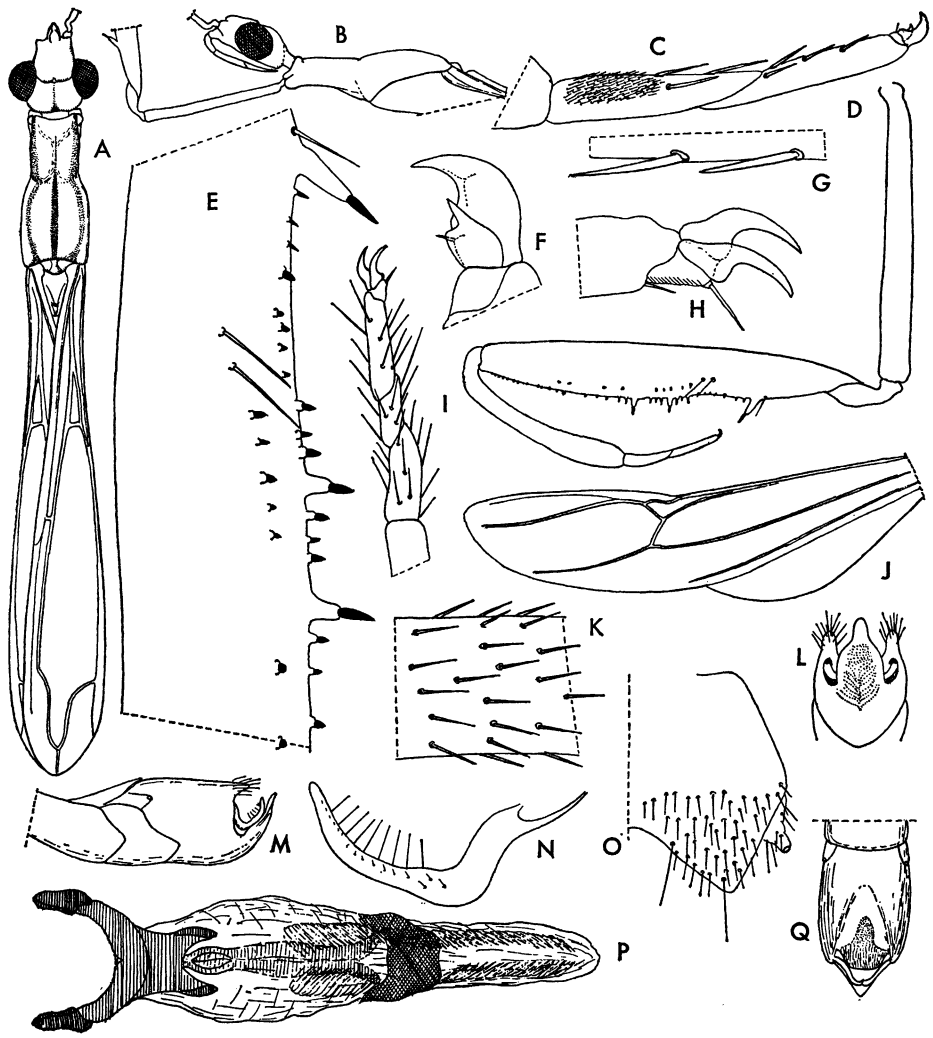


FIG. 132. *Stalemesa carvalhoi*, male. A. General aspect. B. Anterior portion of body, lateral view. C. Fore tarsus. D. Foreleg. E. Base of series of fore femur. F. Claws of foreleg. G. Spines of under side of fore tibia. H. Apex of last tarsal segment and claws of hind leg. I. Tarsus of hind leg. J. Hind wing. K. Portion of posterior femur. L. Pygophore, seen from behind. M. Apical portion of abdomen, lateral view. N. Paramere. O. Left half of eighth sternite. P. Phallus, dorsal view. Q. Pygophore, dorsal aspect.

sclerotization. Struts fused for most of their length, directed toward upper wall of phallotheca. Endosoma wall with spine-shaped projections in large number.

TYPE SPECIES: *Stalemesa carvalhoi*, new species.

DISTRIBUTION: Southern Brazil.

OBSERVATIONS: This genus, dedicated to the memory of the great Swedish hemipterist, Carl Stål, differs from the two remaining genera of the tribe, *Palacus* and *Bergemesa*, by the presence of only two discal cells on the forewings, the proportion of the rostral segments, the extreme reduction of one of the claws of the forelegs, the peculiar shape of the fore femur, and the structure and distribution of the spines and their processes on this article. The extreme reduction of the last ter-

gite of the male and the correlated extension of the sclerotization of the dorsal surface of the pygophore are especially noteworthy.

Stalemesa carvalhoi, new species

Figure 132A–Q

DESCRIPTION: Male: Length to apex of forewings, 6 mm.

General color stramineous. Head somewhat darker, antennae piceous, rostrum stramineous. Pronotum with a median longitudinal line piceous, narrow on fore lobe and somewhat wider on hind lobe (fig. 132A); lateral margin of fore lobe equally dark, continued into 1+1 sublateral dark lines on hind lobe; another narrow dark line on deflexed lateral portion of hind lobe. Lateral portion of anterior part of pronotum and mesopleura and metapleura with a percurrent coccineous line; under surface of thorax stramineous. Abdomen piceous. Forelegs stramineous; coxa (with exception of base), base and apex of femur and tibia, and second segment of tarsus brownish; mid and hind legs uniformly brownish. Forewings fuscous, apical discal cell grayish white, with exception of basal fourth, and with narrow, brownish, longitudinal stripe in apical third of cell; adjacent apical areas of forewing equally grayish white. Veins whitish on basal, and brownish on apical, half of wing; corium testaceous. Surface of body subshining; thorax delicately wrinkled dorsally and microscopically reticulate ventrally; setae of abdomen as shown in figure 132 O.

Head as given in generic description and shown in figure 132A, B. Distance between eyes dorsally slightly larger than their width; in lateral view eyes distinctly longer than high. Rostrum as given in generic description and shown in figure 132B. Antennae with very short pile. Length of first segment, 3.3 mm.; relative length of segments, 1/0.8/-0.15?/0.32?.

Thorax as given in generic description and shown in figure 132A, B; fore lobe with a median longitudinal depression on its posterior two-thirds. Humeri distinctly elevated.

Forelegs as given in generic description and shown in figure 132C–G. Basal spiniferous process of posteroventral series distant from base of article by about three times its own length, inclined apically. Posteroventral series composed, furthermore, of approximately three large and 30 small to very small spiniferous processes, their size strongly reduced on apical third of segment. Anteroventral series composed of not more than 15 short irregularly arranged spines. Hind femora surpassing apex of body by about 3 mm.; their setae and structure of hind tarsi and claws as shown in figure 132H, I, K.

Fore and hind wings as given in generic description and shown in figure 132A, J, not surpassing apex of abdomen.

Genital region of abdomen, eighth sternite, paramere, and phallus as given in generic description and shown in figure 132L–Q.

MATERIAL EXAMINED: Brazil: Estado de Rio de Janeiro: Paraíba do Sul (José Cândido de Melo Carvalho; Museu Nacional), one male holotype, (José Cândido de Melo Carvalho; the American Museum of Natural History), one male paratype.

METAPTERINI STÅL

Emesida STÅL, 1859, p. 328.
Emesaria STÅL, 1874, p. 93.
Metapteraria STÅL, 1874, p. 93.
Emesini VAN DUZEE, 1917, p. 236.
Emesaria (part) DISTANT, 1903, p. 210.
Metapteraria DISTANT, 1903e, p. 216.
Metapterini VILLIERS, 1948, p. 429.
Ghilianellini VILLIERS, 1948, p. 429.
Emesini VILLIERS, 1949a, p. 274.

DESCRIPTION: Small to very large-sized species (6–42 mm.). Generally concolorous, rarely with conspicuous markings. Setae of mid and hind legs and of abdomen not differentiated into microchaetae and macrochaetae, except in one genus.

Head, rostrum, and fore coxae devoid of spines.

Eyes invariably small. Rostrum bent or not between first and second segments. Ratio of first antennal segment to third, 1/0.18–0.02.

Winged, micropterous, and apterous forms known, last two predominant. Mesonotum of winged forms covered by pronotum or not. Scutellum and metanotum invariably lacking spines. Humeral angles lacking projections.

Coxae and trochantera of forelegs lacking spines. Basal spiniferous process of posteroventral series of fore femur conspicuously larger than any of remainder, in no case

penicillate; series generally beginning much beyond base of femur. Tibia from one-half to one-fourth as long as femur, in one instance only three-fifths as long as latter; spines of under surface of tibia well developed, variously modified. Fore tarsi from one-third to fully the length of tibia, generally with one segment, occasionally with two, very rarely with three segments; first segment much longer than either second or third, when present; segments not movably articulated, almost bare above and at sides. Claws either subequal or conspicuously different in size or even reduced to one, in some cases partly or entirely fused with tarsus; their under surface with either ventrally incised lamella or short subbasal processes as usual, though latter few in number, in some cases without processes or even medially incised lamella absent; arolia very short. Claws of mid and hind legs in some cases simple, but generally their under surface with a medially incised lamella; in some claws with a submedian projection, or basal or apical portion of lamella conspicuously salient.

Forewings with one or two cells, viz., discal cell and in some also subbasal cell, latter occasionally secondarily subdivided. Portion of M limiting discal cell inserted on Sc+R. Apex of discal cell approaching wing tip. Hind wings lacking m-cu cross vein, hamus fused to Cu for a considerable extension. Anal lobe from one-half to generally three-fourths as long as wing.

Basal abdominal tergite without spine. Basal portion of first visible sternite membranous. Last tergite of male invariably covering genitalia from above. Phallus varying from symmetrical to highly asymmetrical. Phallosoma from membranous to extensively sclerotized, from irregularly bladder-shaped to elongate-cylindrical, last most frequently found. Endosoma from irregularly shaped to subcylindrical, its processes frequently paired or asymmetrically arranged, membranous or more or less sclerotized, smooth, denticulate or serrated. Genital region of female strongly sclerotized, often conspicuously sculptured. Third gonapophyses fused to form syngonapophysis, which is prominent, generally heavily sclerotized, and has a rounded or slightly emarginated apex.

Male: Testes variable in shape and position, with seven, rarely five, follicles. Seminal vesicles tubular. Mesadenia with a single cylindrical lobe.

Female: Capsula seminalis of vermiform appendage followed by a narrow, elongate glandula apicalis. Ducts of pseudospermathecae about as long as apical ampoule.

TYPE GENUS: *Metapterus* Costa.

DISTRIBUTION: All zoogeographical regions.

KEY TO THE GENERA OF THE METAPTERINI

1. Fore tarsi three-segmented (fig. 142F, M) . . . . . *Emesaya*
   Fore tarsi either two-segmented or not segmented 2
2. Fully winged (fig. 134A) 3
   Micropterous or apterous (fig. 134B) . . . 10
3. Hind lobe of pronotum well developed, completely covering mesonotum (figs. 134A; 157A; 163A; 171C, J) 4
   Hind lobe of pronotum leaving most of mesonotum exposed (figs. 136A, W; 145A; 166A; 174A; 176A; 178A; 179A) 7
4. Subbasal cell of forewings at least four times as long as distance between base of discal cell and insertion of Pcu cross vein on cell, as measured along Cu (fig. 157B); eighth tergite of female almost completely covering gonocoxites laterally (fig. 158Z); pygophore of male small, low, a very large backwardly and upwardly directed projection arising from its postero-inferior border (fig. 158Q); claws of mid and hind legs with conspicuous subbasal projection on under surface (fig. 158G, H) . . . . . *Jamesa*
   Subbasal cell (in some cases subdivided) of forewings not more than twice as long as distance between base of discal cell and insertion of Pcu on cell, as measured along Cu (figs. 134A; 135A; 136M; 163R; 171G; 173D); eighth tergite of female not covering gonocoxites (figs. 134V; 135Q; 163EE, FF; 172R); pygophore not as above, its posterior process arising from upper border (figs. 136K, L; 163T; 173 O); claws of mid and hind legs either simple (figs. 134I; 135P; 163J) or with a submedian projection on under surface (figs. 171FF; 172Y; 173J) 5
5. Process situated basad of interruption of anteroventral series of fore femur inserted slightly but distinctly basad of level of large basal process of posteroventral series (figs. 134F; 135J, X; 136AA; 163E, N); claws of mid and hind legs simple (figs. 134I; 135P; 163J) 6

Process situated basad of interruption of anteroventral series of fore femur not inserted basad of level of large basal process of posteroventral series (figs. 171Q; 172C; 173K); claws of mid and hind legs with submedian projection (figs. 171FF; 172Y; 173J) . . . . . *Pseudometapterus*

6. Claws of forelegs subequal in size (fig. 163K); last tergite of male very strongly deflexed laterally on apical half (fig. 163T, X), parameres sickle-shaped (fig. 163AA); last tergite of female strongly deflexed medially on apical half, forming an inverted, trough-shaped structure (fig. 163DD) . . . . . *Metapterus*

Claws of forelegs very unequal in size (figs. 134J; 135 O, U; 136E); last tergite of male less strongly deflexed on apical half (fig. 135E, G) or not at all, parameres not sickle-shaped; last tergite of female only faintly reflexed on distal half or not at all, in no case forming inverted, troughlike structure . . . . . *Barce* (part)

7. Fore tibia on under surface with hook-shaped denticles (fig. 145C, J); fore tarsus as long as tibia (fig. 145C); anal lobe of hind wing only half of total length of wing (fig. 145M); eighth tergite of female shorter than ninth (fig. 145N) . . . . . *Ghilianella*

Fore tibia on under surface with simple denticles (figs. 136G; 165C, L; 177D, F, J; 178U); anal lobe of hind wing more than half of total length of wing (figs. 135D; 166D; 178H); eighth tergite of female as long as or longer than ninth (figs. 134U; 165V; 174I, U, W; 175R; 176Y, EE; 177G, U; 178DD; 179DD, HH) 8

8. Under surface of claws of mid and hind legs with triangular projection on apical half (figs. 165J; 166I); pygophore of male subsemicircular in lateral view, parameres rod-shaped (figs. 165M; 166Q); ninth tergite of female large, simple, elongate, forming continuous surface with eighth (fig. 165V, X) . . . . . *Onychomesa*

Claws of mid and hind legs without triangular projection; pygophore rarely subsemicircular in lateral view, generally elongate or of irregular outlines; parameres varied in shape; ninth tergite of female small, partly or completely concealed below eighth (figs. 134U; 135Q–T; 136T, KK; 174U, W; 175R; 177G; 179DD) 9

9. Posterior process of pygophore of male relatively short, subrectangular when seen from behind (fig. 136L, HH); parameres rod-shaped, only with setae (fig. 136 O, GG); ninth tergite of female completely covered by eighth from above (figs. 134U; 135R–T; 136KK) . . . . . *Barce* (part)

Posterior process of pygophore of male elongate, spiniform (figs. 176FF; 178K; 179M); parameres either rod-shaped or more or less widened, with sensory spines and cones in addition to simple setae (figs. 176N, V; 178J; 179U, V); ninth tergite of female not completely covered by eighth (figs. 174I; 176Y, EE; 179DD) . . . . . *Schidium*

10. Fore tarsus stout, curved, bare below for most of its length, claws not developed (fig. 181C, J). . . . . *Tubuataita*

Fore tarsus not bare below; claws developed 11

11. Fore femur on whole length ventrally with numerous extremely elongate, spiniferous processes much longer than diameter of segment, somewhat decreasing in size from middle to base and apex of article (fig. 180F); fore tibia on under surface with two irregular series of large, spiniferous processes (figs. 180C, F) . . . . . *Taitaia*

Armature of fore femur and tibia different .12

12. Anteroventral series of fore femur not interrupted at base (figs. 144F; 145C, D; 146G; 148H; 151D; 162D, G); fore tibia on under surface with strongly sclerotized, hooklike, adpressed denticles (figs. 144H; 145J; 146E; 162J); under surface of fore tarsus with two series of adpressed, strongly sclerotized, spiniform setae appearing elongate and knifelike under high magnification (figs. 144I; 145K; 162F) 13

Anteroventral series of fore femur widely interrupted at base (figs. 133G; 134F; 139C; 140K; 141C; 152C, E; 153H; 163N; and others); denticles of under surface of fore tibia not hooklike, their shape conical or blunt (figs. 133F; 136G; 140H; 141F; 152G; 153F; 155J; 158M; 175E; and others); under surface of fore tarsus with depressed or decumbent but not knifelike setae (figs. 139D, G; 140F; 153J, K; 158E, K; 160Q; 163I; 164G; 165D; 167K; 170G; 175F; 177E) 16

13. Anteroventral series of fore femur composed of hairs or setae in some cases arising from wartlike bases, usually a short spine at apex of series (figs. 144F; 150G) 14

Anteroventral series of fore femur consisting of spiniferous processes intermixed with strong setae (figs. 145D; 146G; 148H; 162G) 15

14. Femora of mid and hind legs nodulose (fig. 144G); phallus symmetrical (fig. 144M, Q) . . . . . *Emesella*

Femora of mid and hind legs not nodulose

(fig. 151A); phallus asymmetrical (figs. 149C, G; 150M; 151B, L). . . *Ghinallelia*

15. First spiniferous process of posteroventral series of fore femur situated at base of article (fig. 162D, G); mid and hind claws lacking medially incised, ventral lamella (fig. 162I); mesothorax and metathorax very short, abdomen short and stout, broadly joined to thorax (fig. 162A) . . . . . *Liaghinella*

First spiniferous process of posteroventral series of fore femur situated at some distance from base of article (figs. 146C; 148G); claws of mid and hind legs with medially incised, ventral lamella (figs. 146H, J; 148T, U); thorax and abdomen narrower and longer, abdomen more narrowly joined to thorax (figs. 146A; 147A) . . . . . *Ghilianella*

16. First rostral segment at least twice as long as second; anteocular region of head distinctly longer than postocular, antennae inserted before center of anteocular region but invariably remote from apex of head (figs. 137B; 139B; 141B, EE, GG; 152C; 159C); spined region of fore femur occupying more than half of length of article; fore tarsus not segmented (figs. 137C; 138C, K; 139C; 141W, FF; 152C; 159D), its under surface with two series of adpressed, strong, spinelike setae (figs. 139D, G; 141D; 152I); posterior claws generally with medially incised lamella but lacking other projections (figs. 137D; 139F; 141E); parameres without sensory spines (figs. 137J; 139J; 141M; 152K; 159I) 17

Different combination of characters . . .20

17. Fore femur with accessory series of small, spiniferous processes (fig. 152E); forelegs with a single claw (fig. 152D) . . *Hornylia*

Fore femur without accessory series (figs. 138K; 141C; 159F); forelegs with two unequal claws (figs. 139G; 141D, BB; 159E) 18

18. Rostrum bent between first and second segments (figs. 137B; 141B); postocular region of head either almost parallel-sided (figs. 138F; 141A) or regularly rounded and subsemicircular (figs. 137A; 138A; 139A; 141R, X) in dorsal view; metanotum from slightly to considerably longer than wide (figs. 137A; 138A; 139A; 141R, X) 19

Rostrum straight (fig. 159C); postocular region of head elongate, sides gradually converging posteriorly and somewhat undulate (fig. 159A); metanotum wider than long (fig. 159A) . . . . . *Leaylia*

19. Abdomen linear, parallel-sided (figs. 137E, F; 138E, L) . . . . . *Bargylia*

Abdomen fusiform (fig. 141G, Q, X) . *Bobba*

20. Females 21

Males 35

21. Eighth tergite triangular, pointed behind, completely or almost completely concealing ninth tergite from above (figs. 133N; 153N, KK; 154D, FF; 155X) 22

Eighth tergite rounded, truncate, emarginated, or notched behind; ninth tergite either visible from above or not 24

22. Fore tarsus two-segmented (fig. 155E, F) . . . . . *Ischnobaenella*

Fore tarsus not segmented (figs. 133D; 153D) 23

23. First segment of rostrum reaching level of anterior border of eyes, second much shorter than first (fig. 153C); fore tibia one-fourth as long as fore femur (fig. 153D); metanotum longer than pronotum (fig. 153A); gonocoxites completely fused (fig. 153T) . . . . . *Ischnobaena*

First segment of rostrum not attaining level of anterior border of eyes (fig. 133C); fore tibia one-third as long as fore femur (fig. 133D); metanotum shorter than pronotum (fig. 133A); gonocoxites not fused (fig. 133K) . . . . . *Anandromesa*

24. Claws of mid and hind legs with conspicuous, subbasal, triangular projection (fig. 158G, H); eighth tergite large, its lateral portions almost completely covering gonocoxites from sides, inferior margin of lateral portions of tergite straight (fig. 157T; 158Z) . . . . . *Jamesa*

Claws of mid and hind legs not as above; lateral portions of eighth tergite not covering gonocoxites laterally; if posterolateral projections of eighth tergite partly covering gonocoxites, then inferior margin of lateral portions of tergite conspicuously curved (fig. 174J) 25

25. Eighth tergite large, simple in structure, apically truncate or more or less emarginated or notched, but not with 1+1 elongate, posterolateral, tongue-shaped projections; ninth tergite not visible from above (figs. 134U; 135R–T; 163GG; 164P; 171W; 172U) 26

Eighth tergite varying in shape; ninth at least partly visible from above (figs. 140W; 156T; 160I, M, FF; 165V; 167V; 168H; 169Y; 174U, W; 175R; 176Y, EE; 177G; 179DD, HH); eighth tergite rarely with twisted, tonguelike, posterolateral projections and, in this case, ninth tergite not visible from above (fig. 174I–L) 29

26. Postocular region of head wide, either sub-

semicircular in dorsal view (fig. 134A, B) or with sides subparallel or slightly converging posteriorly and distinctly constricted at neck (figs. 136A, W, X; 156A; 163A, B, H; 171K; 172A, N; 173A); first segment of rostrum varying in relative length; spined portion of fore femur longer than half of length of article, processes transformed into denticles on apical portion of femur (figs. 133D; 135J, X; 136AA; 156E; 163E; 171N; 172P) 27

Postocular region of head narrow in dorsal view, sides gradually converging posteriorly, not constricted before neck (fig. 164A, C); first segment of rostrum twice as long as second (fig. 164B); spined portion of femur half as long as article, processes continuing to apex of article, not transformed into denticles distally (fig. 164F, H) . . . . . *Nandariva*

27. Process inserted basad of interruption of anteroventral series of fore femur situated slightly basad of level of first process of posteroventral series (figs. 134F; 135J, X; 136D, AA; 163E, N) 28

Process inserted basad of interruption of anteroventral series of fore femur situated slightly apicad of level of first process of posteroventral series (figs. 171Q; 172C; 173K) . . . . . *Pseudometapterus*

28. Claws of forelegs subequal in size (fig. 163K); last tergite very strongly deflexed on distal half, forming inverted, troughlike structure (fig. 163DD) . . . . . *Metapterus*

Claws of forelegs conspicuously unequal in size (figs. 134J; 135 O; 136E); last tergite only faintly if at all deflexed distally, not forming inverted, troughlike structure (figs. 134X; 136V) . . . . . *Barce*

29. Fore tarsus two-segmented (figs. 156C, J; 168Y; 169C, BB; 170F, G) 30

Fore tarsus not segmented 31

30. Clypeus with spiniform projection (fig. 156B); fore tarsus about half as long as tibia (fig. 156C) . . . . . *Ischnonyctes*

Clypeus without projection (figs. 168T, Y; 169B; 170C); fore tarsus only about one-third as long as tibia (figs. 168Y; 169C, BB; 170F) . . . . . *Pseudobargylia*

31. Ninth tergite large, forming continuous surface with eighth (figs. 140W, X; 165V, X; 167U, V) 32

Ninth tergite much smaller than eighth, inserted below level of eighth (figs. 160I, J, K, M, P, EE–GG; 174I–L, U–W; 175R, T, V; 176W, Y, Z, DD, EE; 177G, I, T, U, W, X; 178DD; 179AA, DD, HH) 34

32. Surface of head and body conspicuously granulated (fig. 140B, C); thorax extremely long and slender, metanotum slightly longer than mesonotum (fig. 140A); claws of mid and hind legs with medially incised ventral lamella, but otherwise not modified (fig. 140G, I) . . . . . *Berlandiana*

Surface of head and body not conspicuously granulated, virtually smooth; thoracic nota less elongate, mesonotum and metanotum much shorter than pronotum (figs. 165A; 167A); claws of mid and hind legs variously modified as described in next couplet. .33

33. Bristles of under surface of mid and hind tarsi very numerous, those of third segment capitate, forming a scopula (fig. 167F, I); claws of mid and hind legs with a long projection on center of under surface (fig. 167F, J). . . . . *Pelmatomesa*

Bristles of under surface of tarsi of mid and hind legs of normal arrangement and structure (figs. 165I; 166H); claws of mid and hind legs with triangular projection on apical half of under surface (figs. 165J; 166I) . . . . . *Onychomesa*

34. First rostral segment not attaining level of anterior border of eyes, less than twice as long as second (figs. 174C; 175B; 176B; 177C; 178B; 179E) . . . . . *Schidium*

First rostral segment attaining level of center of eyes, from two to three times as long as second (figs. 160C, O; 161A) . . . . . *Leptinoschidium*

35. Pygophore relatively small, low in lateral aspect, with very large, backwardly and upwardly directed process arising posteriorly from ventral border (figs. 157I; 158Q, R); claws of mid and hind legs on under surface subbasally with large, triangular projection (figs. 157G, 158G, H) . . . . . *Jamesa*

Pygophore not as above; structure of claws of mid and hind legs different 36

36. Fore tarsus two-segmented (figs. 154K; 155E, F; 168Y; 169C, BB; 170F, G) 37

Fore tarsus not segmented 39

37. Fore tibia one-fourth as long as femur (figs. 154K; 155F); metanotum distinctly longer than mesonotum (fig. 155A). . . . . *Ischnobaenella*

Fore tibia more than one-fourth as long as femur (figs. 156C; 168Y; 169C; 170C); metanotum as long as, or shorter than, mesonotum (figs. 156A; 168A, V; 169A, X; 170A) 38

38. Clypeus with spiniform projection (fig. 156B); fore tarsus about half as long as tibia (fig. 156C) . . . . . *Ischnonyctes*

Clypeus without projection (figs. 168T, Y; 169B; 170C); fore tarsus only about one-

third as long as tibia (figs. 168Y; 169C, BB; 170F) . . . . . *Pseudobargylia*

39. Spiniferous processes occupying distinctly less than half of length of fore femur (figs. 153D; 160R); first segment of rostrum invariably at least twice as long as second (figs. 153C; 160C, O; 161A) 40

Spiniferous processes of fore femur occupying at least half of length of article (figs. 134F; 135J; 140D; 163E; 165C; 167C; 171N; 174F; 179G); if spined portion slightly shorter than half of length of femur, then first and second rostral segments subequal in length (figs. 177C, D; 178B, C) . . .41

40. First segment of rostrum attaining level of center of eye (figs. 160C, O; 161A); pygophore with long spiniform process (figs. 160E, N, X; 161H); parameres strongly widened apically, their distal portion with numerous sensory spines (figs. 160D, G, W, AA; 161C, I) . . . . . *Leptinoschidium*

First rostral segment not surpassing level of anterior border of eyes (fig. 153C); pygophore without spiniform process (fig. 153P, BB, HH, II); parameres simple, rod-shaped, without sensory spines (fig. 153AA) . . . . . *Ischnobaena*

41. Thorax extremely narrow and elongate, metanotum distinctly longer than mesonotum (fig. 140A); pygophore semicircular in lateral view (fig. 140L); head and body conspicuously granulate (fig. 140B, C) . . . . . *Berlandiana*

Thorax less slender, metanotum not longer than mesonotum; outline of pygophore semicircular or irregular in lateral view; surface of body either granulate or smooth 42

42. Under surface of tarsi of mid and hind legs with very numerous setae, those of third segment capitate, forming a scopula (fig. 167F, I); under surface of claws of mid and hind legs with long, pointed projection beyond middle (fig. 167J); parameres with only simple setae (fig. 167L) . . . . . *Pelmatomesa*

Under surface of tarsi of mid and hind legs with only a moderate number of setae, those of third segment not modified and not forming a scopula (figs. 135Z; 163M; 165I; 172G, W; 178E); claws of mid and hind legs simple or modified; parameres with only simple setae, in some cases also with sensory spines 43

43. Under surface of claws of mid and hind legs at or beyond middle with triangular or pointed projection, varying in size (figs. 165J; 166I; 171E, M, FF; 172Y; 173J) 44

Under surface of claws of mid and hind legs generally with medially incised lamella but without triangular projections 45

44. Clypeus frequently, labrum invariably, with distinct projections (figs. 171A, B, L; 172B, O); modified setae pointed or rounded apically (figs. 171S; 172M); one of claws of fore tarsus very strongly reduced (figs. 171R; 172E); process inserted basad of interruption of anteroventral series of fore femur situated slightly apicad of level of first process of posteroventral series (figs. 171Q; 172C); parameres only with setae (figs. 171U, GG; 172L, Z) . . *Pseudometapterus*

Clypeus and labrum invariably without projections (figs. 162B; 166B); modified setae delicately pointed apically (figs. 165F–H; 166E); claws of fore tarsus subequal in size (figs. 165K; 166K; process inserted basad of interruption of anteroventral series of fore femur situated slightly basad of level of first process of posteroventral series (figs. 165E; 166F); parameres with setae and with sensory spines (figs. 165R; 166 O, R) . . . . . .*Onychomesa*

45. Clypeus often and labrum almost invariably with more or less developed projections (figs. 135A; 156B; 163F); processes of fore femur occupying distinctly more than half of length of article (figs. 134F; 135J, X; 136AA; 156C; 163E); parameres with setae only (figs. 134 O; 135L, CC; 136GG, 163AA) 46

Clypeus and labrum without projections (figs. 174C; 176B; 177C; 179E), only in one species labrum with minute subcylindrical projection (fig. 175B); processes of fore femur occupying approximately half of length of article (figs. 174F; 175D; 177D; 178W; 179G); parameres with setae and sensory spines or cones (figs. 175N; 177M, N; 178J; 179V, W) . . . . . *Schidium*

46. Claws of forelegs subequal in size (fig. 163K); last tergite with sides strongly deflexed on apical half (fig. 163T, X); parameres sickle-shaped (fig. 163AA) . . . . . *Metapterus*

Claws of forelegs very unequal in size (figs. 134J; 135 O, U); sides of last tergite only very slightly deflexed, or not at all (figs. 134P; 135E, F; 136DD); parameres not sickle-shaped . . . . . *Barce*

The foregoing key, reflecting the difficulties experienced in neatly categorizing the not too striking features of the external morphology of the metapterine genera, is not easy to use. With one exception, the highly diagnostic

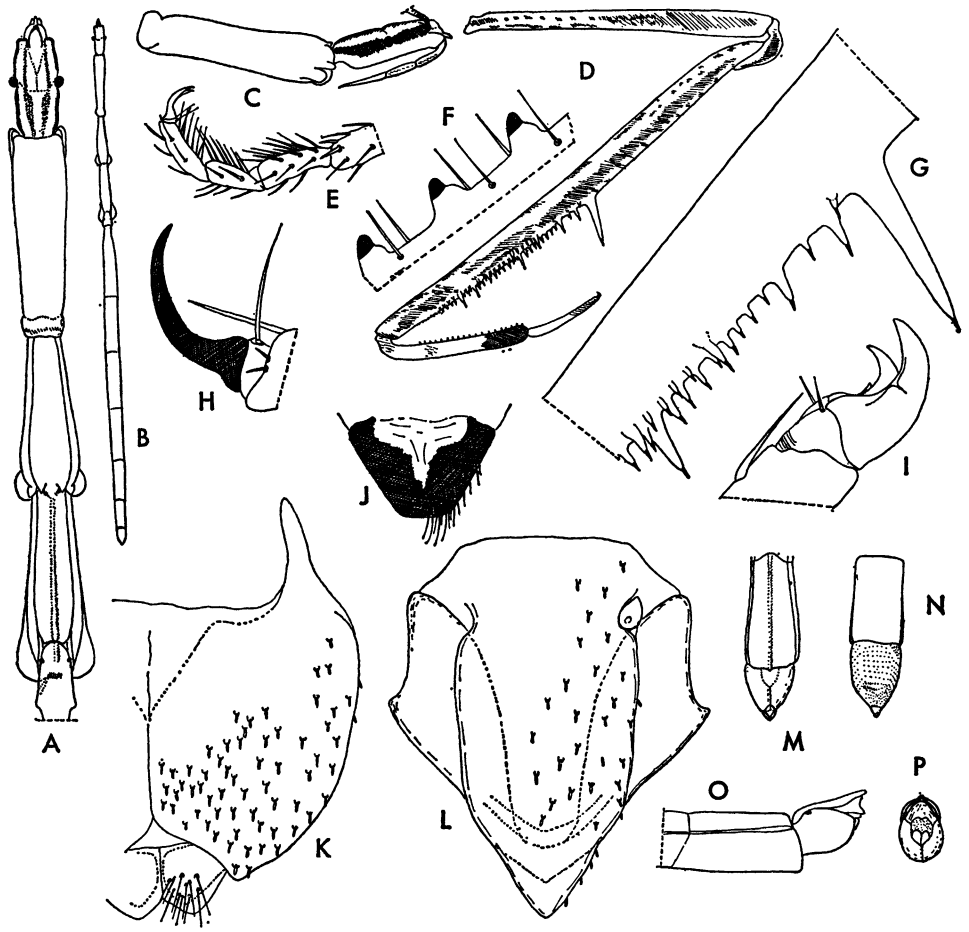


FIG. 133. *Anandromesa hesychastes*. A. Anterior portion of body, dorsal view; pattern shown on head. B. General aspect. C. Head and prothorax, side view; pattern shown on head. D. Foreleg, with color pattern. E. Posterior tarsus. F. Denticles of under surface of fore tibia. G. Base of series of fore femur. H. Apex of last tarsal segment and one claw of hind leg. I. Apex of fore tarsus, with claws of foreleg. J. Syngonapophysis. K. Gonocoxite with gonapophysis. L. Eighth and ninth tergites, as seen on slide mount. M. Apical portion of abdomen, ventral view. N. Apex of abdomen, dorsal aspect. O. Distal region of abdomen, side view. P. Genital region, seen from behind.

characters of the phallus have not been taken into account for obvious practical reasons, though in doubtful cases the preparation of the genitalia may be advisable. It is hoped that the abundant references to the illustrations contained in this paper will obviate some difficulties.

ANANDROMESA, NEW GENUS

DESCRIPTION: Apterous female: Medium-sized species (20 mm.).

Body surface virtually smooth, dull, head and body with scattered, minute, inconspicuous, setiferous tubercles; abdomen rugose. Setae sparse and very short; modified setae short, rounded apically. General color stramineous, with inconspicuous darker pattern elements.

Head subrectangular in lateral and dorsal views; anteocular and postocular portions of about equal length. Postocular region with sides almost parallel in lateral and dorsal views, abruptly constricted at neck. Labrum in shape of small conical projection; clypeus

somewhat elevated. Eyes extremely small; interocular sulcus attaining level of posterior border of eyes. Rostrum straight; first and second segments of subequal size, apex of former remote from level of anterior border of eye; third segment distinctly longer than first or second. Antennae inserted near apex of head.

Thorax moderately elongate. Prothorax subcylindrical, almost straight in lateral view; hind lobe of pronotum distinct, collar-like. Mesonotum and metanotum subequal in size, both somewhat shorter than pronotum.

Forelegs relatively short. Femur with spiniferous processes bearing short apical spines; these processes beginning at middle of article. Posteroventral series beginning with a very long process, followed by several shorter mixed with very numerous small ones, latter toothlike on apical portion of article. Anteroventral series interrupted at base, composed of medium-sized and small processes. Tibia one-third of length of femur, its ventral surface with one series of short, strongly sclerotized, toothlike denticles. Fore tarsus about half as long as tibia, not segmented, strongly sclerotized, virtually bare above and at sides, ventrally with deflexed spiniform setae. Two claws, subequal in size, inner one with medially incised, ventral lamella, outer one with very small, submedian projection. Mid and hind legs relatively stout, hind femur not attaining apex of abdomen. Mid and hind tarsi with basal segment slightly longer than third, second shortest. Setae of ventral surface of tarsal segments simple, short and sparse. Claws very slender, regularly curved, ventral lamella very low, hardly perceptible.

Abdomen parallel-sided, keeled below on most segments. Eighth tergite subtriangular, pointed apically, horizontal, covering ninth tergite from above; latter small, vertical, pointed in middle behind. Gonocoxites and gonapophyses simple, separated. Syngonapophysis not emarginated behind.

TYPE SPECIES: *Anandromesa hesychastes*, new species.

ETYMOLOGY: *Anandros*, husbandless; and *Emesa*, a genus of the Emesinae.

DISTRIBUTION: Australian Region.

OBSERVATIONS: The new genus resembles the Oriental *Ischnobaena* and *Ischnobaenella*. The main differences between *Ischnobaena* and *Anandromesa* are shown in the key to the genera of the tribe. *Anandromesa* resembles *Ischnobaenella* in the size of the basal segment of the rostrum, which does not reach the level of the anterior border of the eyes, but differs by the relatively longer second segment, the different shape of the head, the less-elongate thorax with the relatively shorter mesonotum, and also the unsegmented fore tarsus. As the male is not known, the true relationships of *Anandromesa* cannot yet be established with certainty.

Anandromesa hesychastes, new species

Figure 133A–P

DESCRIPTION: Apterous female: Length, 20.25 mm.; head, 1.5; thorax, 6.75; abdomen, 12 mm. General body shape as shown in figure 133B.

General color testaceous. Head and thorax with a dark brown stripe laterally (fig. 133C); dorsal surface of head with 1+1 longitudinal fasciae brownish. Eyes red. First and second segments of rostrum slightly, third strongly, darkened. Antennae of general color, first segment with short, subapical annulus dark brown. Dorsal and ventral surfaces of thorax slightly mottled with brown. Abdomen of general color, slightly mottled with brown on upper and lower surfaces, dorsum with three longitudinal red lines. Forelegs with brownish pattern as shown in figure 132D; femora of mid and hind legs with longitudinally arranged tiny brown dots, and with two or three incomplete dark annuli apically; similar but fainter annuli basally on tibiae. Apex of tibiae and tarsus with claws fuscous.

Body surface as given in generic description. Rugosity of abdomen delicate, irregular.

Head and rostrum as given in generic description and shown in figure 133A–C; labral projection distinct. Length of first segment of antennae, 7.5; of second, 5.2 mm.

Thorax as given in generic description and shown in figure 133A–C; metanotum delicately carinate longitudinally along middle.

Forelegs as given in generic description and shown in figure 133D, F, G, I. Coxa somewhat longer than prothorax. Posteroventral series of femur composed of one large, four medium-sized, and about 30 small, processes. Anteroventral series consisting of three small and 22 very small processes; process situated

basad of interruption inserted apicad of level of large basal process of posteroventral series. Tibia with approximately 20 ventral denticles. Mid and hind legs as given in generic description and shown in figure 133E, H.

Abdomen as given in generic description and shown in figure 133B; genital region as shown in figure 133M–P, genital sclerites as shown in figure 133J–L.

MATERIAL EXAMINED: Australia: Northwest Australia: Derby (South Australian Museum), one female holotype.

BARCE STÅL

Barce STÅL, 1865, p. 163.
Metapterus AUCT. (part).

DESCRIPTION: Macropterous or micropterous. Small to medium-sized insects (7–13 mm.).

Body surface dull, from virtually smooth to coarsely granulated. Setae sparse; modified setae pointed or rounded apically. General color from testaceous to piceous, dark pattern elements not conspicuous.

Macropterous form: Head moderately elongate, subfusiform, anteocular region as long as, or longer than, postocular; latter either subsemicircular in dorsal view, or with sides subparallel, more or less converging posteriorly, generally strongly constricted before neck. Clypeus with or without spiniform process; labrum invariably projecting. Eyes medium-sized; interocular furrow not surpassing level of posterior border of eyes in dorsal view. Rostrum straight; articles not conspicuously thickened; first segment not reaching level of anterior border of eyes, second slightly shorter, third about as long as first. Antennae inserted near apex of head.

Fore lobe of pronotum subcylindrical. Hind lobe either completely covering mesonotum, with one median, 1+1 sublateral, and in some cases 1+1 lateral longitudinal carinae, or very short, collar-like, covering only base of mesonotum.

Forelegs stout to moderately delicate. Femora from parallel-sided to distinctly widened at middle, spined portion covering distinctly more than half of length of article. Posteroventral series beginning with a large, spiniferous process followed by several shorter interspersed with numerous small ones. Anteroventral series composed of medium-sized and small spiniferous processes, interrupted at base, process situated basad of interruption inserted distinctly basad of level of large, basal process of posteroventral series. Fore tibia from one-half to slightly more than one-third as long as femur, ventrally with two series of conical denticles. Fore tarsus from one-third to slightly less than one-half as long as tibia, ventrally with two series of deflexed spiniform setae. Claws of forelegs unequal in size; inner one large, with a medially incised ventral lamella; outer one small, simple. Tarsi of mid and hind legs from stout to slender, with long setae in moderate number; first and third segments subequal in size, second shorter. Claws of mid and hind legs slender, regularly curved, their under surface with medially incised lamella.

Forewings falling from slightly to considerably short of apex of abdomen; discal and subbasal cells present, latter frequently subdivided, less than twice as long as distance between base of discal cell and insertion of Pcu on cell as measured along Cu. Pterostigma attaining wing tip. Hind wings as long as forewings. Hamus approaching Sc+R gradually and then joining it, in some cases evanescent. M-cu cross vein absent; M meeting Cu basad of level of caesura, fused to Sc for considerable distance. R+M and Cu extending beyond level of cross vein to near wing border; R+M forked at center or subapically; distal portion of Cu frequently connected to apical branch of M. Anal lobe about three-fourths as long as wing.

Abdomen with sides subparallel to fusiform; keeled below on most segments. Genitalia of both sexes not elevated in relation to longitudinal axis of abdomen.

Male: Seventh tergite tongue-shaped, attaining or surpassing apex of pygophore. Eighth sternite large, emarginated at center behind. Pygophore somewhat compressed laterally, from irregularly rectangular to subsemicircular in side view. Process of posterosuperior border of pygophore mostly subrectangular, truncate apically and somewhat bent backward at tip, rarely pointed. Parameres rather small, slender, only slightly curved, with numerous short setae. Phallus of normal size, symmetrical. Basal plates fused. Phallobase elongate, irregularly subcylindrical, sclerotized dorsally along its whole

length, membranous below on its apical two-thirds. Endosoma rigid, probably not eversible, transformed into a strongly sclerotized, tubelike structure partly protruding from phallobase, prolonged on emergence from phallobase into more or less complex, membranous structure with variously shaped processes and sclerotized regions.

Female: Eighth tergite large, truncate or emarginated apically, subhorizontal; ninth tergite small, vertical, not visible from above, situated at or cephalad of level of posterior border of eighth tergite. Gonocoxites separated. Gonapophyses very small, separated. Syngonapophysis emarginated apically, its posterolateral angles rounded.

Micropterous form: General characters like those of macropterous form. Pronotum subcylindrical, its hind lobe distinct but very short, collar-like. Mesonotum shorter than pronotum, metanotum shorter than mesonotum, subquadrate. Wing pads minute, from straplike to triangular, on mesonotum and metanotum, or on mesonotum only. Abdomen from slightly to conspicuously fusiform.

TYPE SPECIES: *Ploiaria fraterna* Say (as *Barce annulipes* Stål) (by monotypy, Stål, 1866).

DISTRIBUTION: Nearctic and Neotropical regions.

The species of *Barce* found in the Neotropical Region are not endemic.

OBSERVATIONS: The genus was first described in a key by Stål (1865). Later Stål (1866) described a single species (*Barce annulipes*) for his genus. This species, as shown in the present paper, is a synonym of Say's *Ploiaria fraterna*, which thus becomes the type of *Barce*.

Before McAtee and Malloch's (1925) paper, the name *Barce* was generally applied to the American species of the group, but these authors considered the European *Metapterus linearis*, type of the monospecific *Metapterus*, to be congeneric with the American species and thus applied the name *Metapterus* also to the New World species then known. Subsequent authors have followed McAtee and Malloch in this respect.

It has now become obvious that *Metapterus* and *Barce* are not congeneric, and that Stål (1865, 1866) had been fully justified in distinguishing between *Barce* and *Metapterus* (as *Carambis*). In addition to the characters mentioned in the key, the two genera can be distinguished by the completely different structures of the phalli, as evident from a comparison of the respective descriptions and illustrations.

It has been found necessary to include in *Barce* macropterous forms with a complete pronotum (*aberrans*, *fraterna*, and *uhleri*), together with others in which the hind lobe of the pronotum is strongly reduced (*husseyi* and *werneri*). The highly specialized structure of the male genitalia agrees completely in both groups, and no other morphological feature could be found to separate them. On the other hand, *B. aberrans* occupies an isolated position in the genus, differing from the other species in the shape of the head, the spiniferous processes which occupy almost the whole under surface of the fore femora, and the relatively simple structure of the phallus, but unless weighty additional information becomes available, I do not feel justified in segregating *aberrans* from *Barce* subgenerically or generically.

KEY TO THE SPECIES OF *Barce*

1. Clypeus with angular or spiniform process (fig. 135A) 2
   Clypeus lacking process (figs. 134C; 136B, C) 5
2. Pale stripe of ventral surface of head as wide as interocular space, and without dark spot ventrally on each side behind eye; upper margin of pygophore with broad squarish process, no erect spine within upper border of pygophore (fig. 135F–H) . . . . *fraterna*
   Pale stripe of ventral surface of head narrower than interocular space, or with a distinct dark spot on each side behind eye; upper margin of pygophore either produced backward at apex into squarish process (as shown in fig. 136HH) or with a long spine within upper border (fig. 135V, W) 3
3. Upper margin of pygophore produced backward at apex into squarish process (as shown in fig. 136HH) . . . . *scaramuzzai*
   Upper margin of pygophore with long spine within upper border (fig. 135V, W) . . . 4
4. General color fuscous; surface rugosities of abdomen forming distinct reticulation; apical spine of pygophore conspicuously curved backward at apex (fig. 135W); eighth tergite of female not or only barely emarginate at apex (fig. 135BB) . . . . . *uhleri*
   General color stramineous; surface rugosities of

abdomen mainly longitudinal, not forming reticulation; apical spine of pygophore straight or only slightly curved backward at apex (fig. 135V); eighth tergite of female with short and acute apical incision . . . . . *neglecta*

5. Head and thorax granulate; postocular region of head subsemicircular in dorsal view (fig. 134A, B); insertion of basal process of posteroventral series of fore femur less than its own length from base of article (fig. 134F) . . . . . *aberrans*

Head and thorax very delicately and sparsely granulate, almost smooth; postocular region of head with sides subparallel in dorsal view, only slightly converging posteriorly in dorsal view (fig. 136A, W, X); insertion of basal spine of posteroventral series of fore femur more than its own length from base of article (fig. 136F, AA) 6

6. Pale stripe of ventral surface of head narrower than interocular space (fig. 136C); fore femur about 18 times as long as maximum width (fig. 136F); pygophore subrectangular in lateral view, its apical projection short, strongly bent backward (fig. 136K) . . . . . *husseyi*

Pale stripe of ventral surface of head as wide as interocular space; fore femur 10 to 12 times as long as maximum width (fig. 136AA); pygophore subsemicircular in lateral view, its apical projection elongate, only faintly bent backward (fig. 136EE) . . . . . *werneri*

Barce aberrans (McAtee and Malloch), new combination

Figures 3M; 134A–X

Metapterus aberrans McAtee and Malloch, 1925, p. 86, fig. 147.

As mentioned in the discussion of the genus, *aberrans* differs considerably from the more orthodox species of *Barce* and thus continues to justify its specific name. Its main structures are figured here. The forewings of the macropterous female almost attain the apex of the seventh tergite (fig. 134A); the hind lobe of its pronotum covers the mesonotum completely (fig. 134A, C). The phallus (fig. 134M, Q) is characterized by the tubelike endosoma prolonged beyond the phallobase for more than the length of the latter, enclosed for its whole length in a delicate membrane.

Material Examined: United States: Texas: Victoria, Kurans Prairie, March 9, 1913, under cow chips (J. D. Mitchell; United States National Museum), two micropterous females; (J. D. Mitchell; the American Museum of Natural History), one micropterous male.

Distribution: United States (Texas).

Type: Male, the University of Kansas.

Barce fraterna (Say)

Plate 2, figure 4; plate 4, figures 1, 2, 5; text figures 6I; 7B, D; 12J; 13G–I; 135A–T

Ploiaria fraterna Say, 1831, p. 33.

Emesa fraterna: Dohrn, 1859, p. 52.

Barce fraterna: Nathan Banks, 1909, p. 47, fig. 2.

Metapterus fraternus: McAtee and Malloch, 1925, p. 89, figs. 139, 141–143, 160–164.

Barce annulipes Stål, 1866, p. 168 (new synonymy).

Metapterus annulipes: McAtee and Malloch, 1925, p. 88, figs. 145, 156–159.

Emesodema simplicipes Uhler, 1878, p. 430.

Barce simplicipes: Uhler, 1886, p. 26.

Ploiaria simplicipes: Van Duzee, 1916, p. 28.

Barce banksii Baker, 1910, p. 227, figs. 97B–97D (new synonymy).

Metapterus banksii: McAtee and Malloch, 1925, p. 87, fig. 155.

Metapterus normae Elkins, 1951a, p. 90, figs. 1–9 (new synonymy).

Upon dissections of males identified, respectively, as *fraterna*, *annulipes*, *banksii*, and *normae*, I found that the very complex phallus, with its unique apical whiplike process, was completely identical in all specimens thus examined. It is concluded, therefore, that we have before us a single species showing a tendency toward formation of geographical races, identifiable in some cases but not all by the combination of such external characters as the coloring of the mid and hind femora, the size of the clypeal process, body length, and the relative size of the coxa and tibia of the forelegs. The shapes of the last tergite of the male and the eighth tergite of the female, used by McAtee and Malloch, in addition to other characters, to distinguish *annulipes* from *fraternus*, are too variable to be used here; the same seems to be true for the shape of the pygophore (see fig. 135G–I), and the relative length of the spiniferous processes of

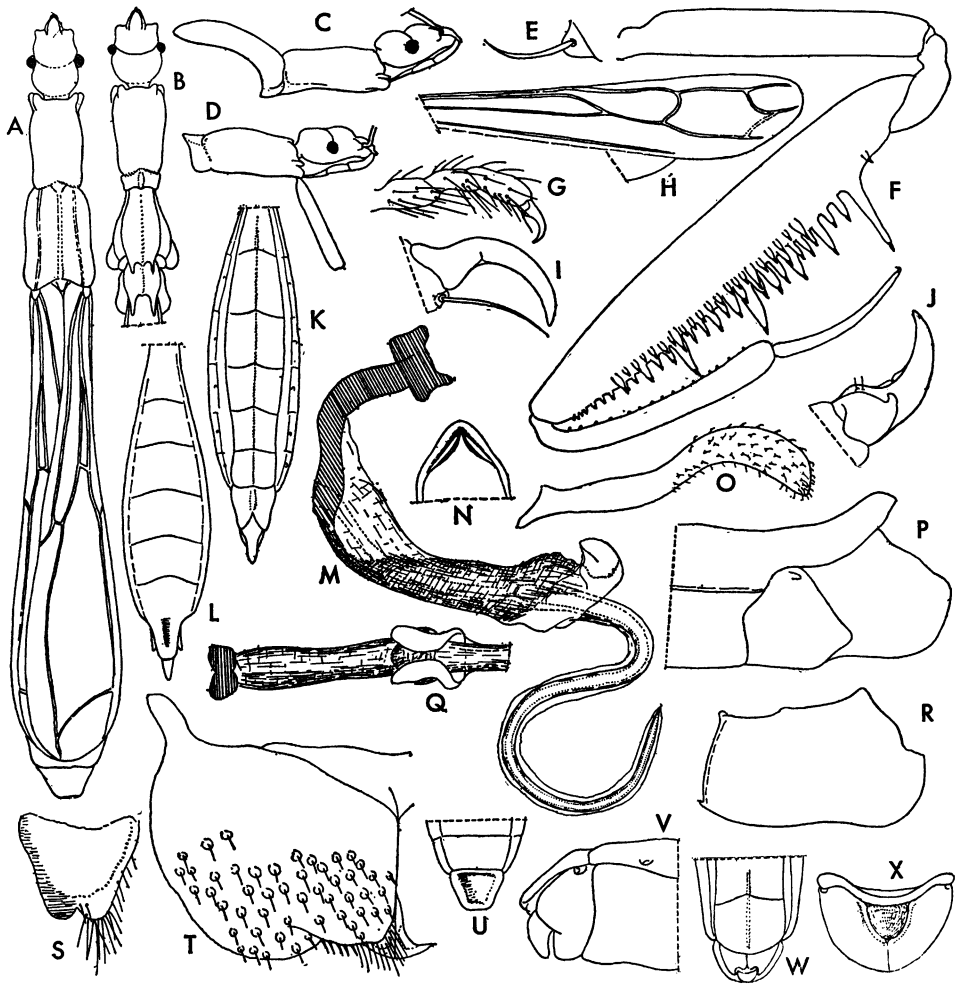


FIG. 134. *Barce aberrans*. A. Macropterous female, general aspect. B. Head and thorax of micropterous male, seen from above. C. Head and prothorax of macropterous female, side view. D. Anterior portion of body of micropterous male, lateral aspect. E. Seta of hind femur. F. Foreleg. G. Posterior tarsus. H. Hind wing. I. Claw of hind leg. J. Claws of foreleg. K. Abdomen of micropterous male, ventral view. L. Abdomen of micropterous male, dorsal view. M. Phallus, side view. N. Apex of pygophore, seen from behind. O. Paramere. P. Apex of abdomen of male, lateral aspect. Q. Phallosoma, seen from above. R. Pygophore, side view. S. Syngonapophysis. T. Gonocoxite with gonapophysis. U. Genital region of female, seen from above. V. Apex of abdomen of female, side view. W. Apex of abdomen of female, seen from below. X. Genital region of female, posterior aspect.

the fore femur as compared to the diameter of this article (fig. 135J, K).

In North America, the races of *fraterna* can be defined as follows:

Barce fraterna fraterna: Size, 12–14.5 mm. Clypeal process well developed (fig. 135A); ratio of length of fore tibia to fore coxa, less than 0.7; mid and hind femora uniformly testaceous, with a not invariably very conspicuous, fuscous, subapical annulus; pygophore generally as shown in figure 135I. Distribution: Central, eastern, and southern United States.

Barce faterna annulipes: Size, 10–11 mm. Clypeal process shorter than in *fraterna fraterna*; ratio of fore tibia to fore coxa, less than 0.7; mid and hind femora conspicuously annulated with light and dark; pygophore much like that of *fraterna fraterna.* Distribution: Central and eastern United States.

Barce fraterna banksii (=*normae*): Size, 9–12 mm. Clypeal process variable, from a mere triangular wart to a long, spiniform process; ratio of fore tibia to fore coxa, 0.7 or more, only very rarely less; mid and hind femora like those of *fraterna fraterna*, rarely faintly annulated; pygophore variable (fig. 135G, H). Though the relative size of the fore coxa and tibia will readily separate *fraterna fraterna* from *fraterna banksii* in the United States, the character proves useless in Caribbean specimens. In a single lot from Cuba (central Mercedes, Scaramuzza), the following values were obtained for the ratio of the fore tibia to the fore coxa: males, 0.59, 0.72; females, 0.57, 0.74. Distribution: Western, southwestern, and southern United States; Mexico; Caribbean to Colombia and Ecuador.

Numerous specimens of *fraterna* from all parts of the range of the species have been examined in the preparation of the present monograph.

DISTRIBUTION: Western, southwestern, and southern United States; Mexico; Cuba; Jamaica; Colombia; Ecuador.

This is the only species of *Barce* with populations in the Neotropical Region.

TYPE: Of *fraterna*, unknown; of *annulipes*, female, Museum Zoologicum Universitatis; of *simplicipes*, unknown; of *banksii*, unknown; of *normae*, male, the American Museum of Natural History.

Barce husseyi, new species

Figure 136A–V

Ischnonyctes sp. MCATEE AND MALLOCH, 1925, p. 11, fig. 140.

DESCRIPTION: Macropterous. Length of male, 13; of female, 14 mm.

Color of head and body fuscous laterally and ventrally, somewhat lighter dorsally; anterior acetabula, lateral portions of hind lobe of pronotum, lateral carinae of mesonotum, and last tergite of both sexes luteous. Ventral surface of abdomen more or less distinctly spotted with luteous. Head almost concolorous above, ventrally with a stramineous stripe decidedly narrower than interocular space. Rostrum and antennae uniformly brownish. Forewings subhyaline at base, light cinereous on apical two-thirds, discal cell and apical region with brown blotches arranged in irregular longitudinal series. Forelegs uniformly fuscous, large process of femur and basal third of tarsus whitish. Mid and hind legs testaceous, femora darkened apically, in some cases with a few very faint, narrow, luteous annuli; three similar but invariably distinct annuli on basal half of tibia. Body surface smooth, dull; head and thorax with numerous concolorous scalelike setae in addition to usual ones. Modified setae slender, pointed (fig. 136H). Abdomen faintly striate longitudinally on venter; striae more conspicuous on apical sternite, transversely oriented.

Shape of head and rostrum as shown in figure 136A–C. Clypeus without projection, process of labrum very short. Length of first segment of antennae (male holotype), 6.2 mm.; relative length of segments, 1/0.75/-0.05/0.35.

Thorax as shown in figure 136A–C. Fore lobe elongate, cylindrical; hind lobe short, covering only extreme base of mesonotum, slightly carinate longitudinally along middle. Mesonotum twice as long as wide, convex, slightly depressed longitudinally along middle.

Forelegs slender (fig. 136F); tibia half as long as coxa; femur about 18 times as long as maximum width, spined portion occupying three-fifths of total length of segment. Details of femur, tibia, and tarsus as shown in figure 136D, E, G. Posterior femora surpass-

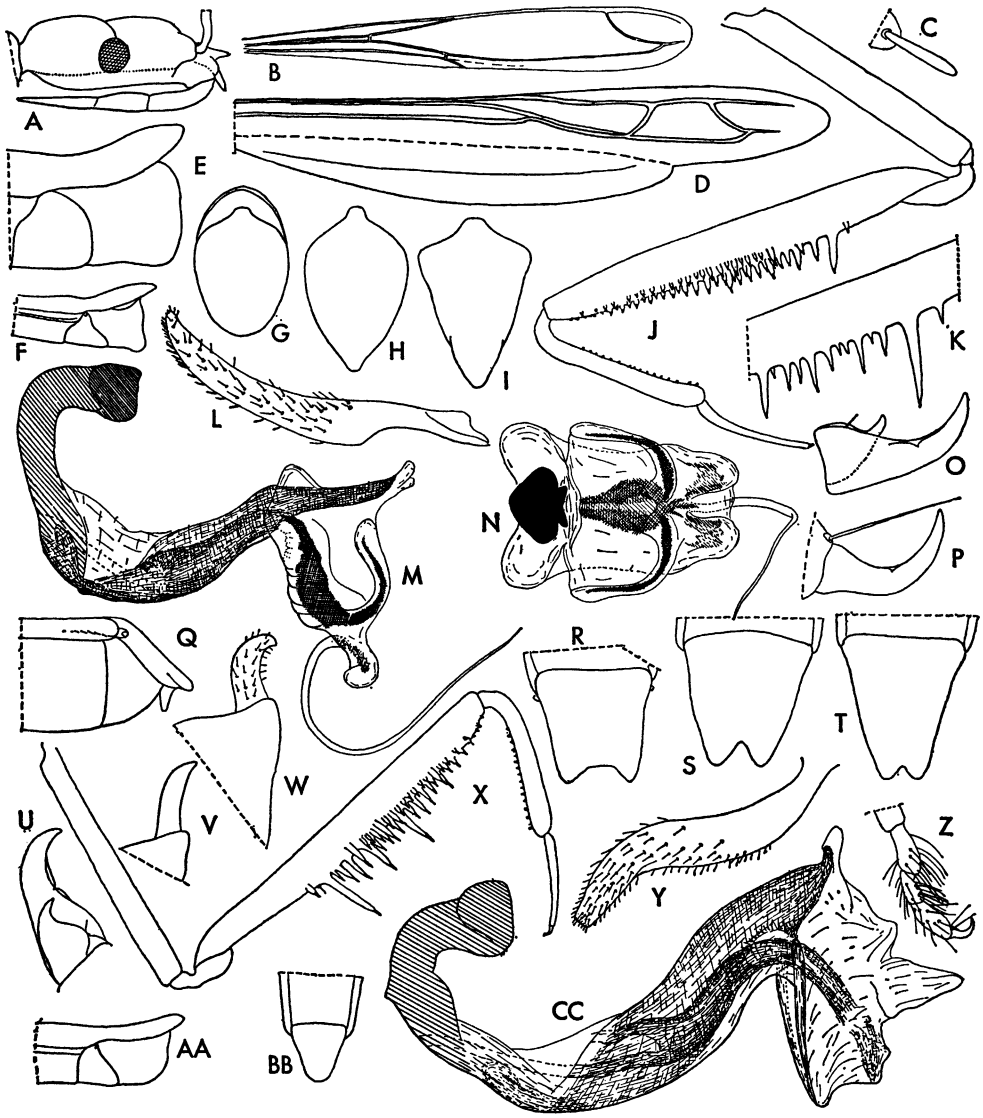


FIG. 135. A–D. *Barce fraterna*, male, Jacksonville, Florida. A. Head, lateral aspect. B. Forewing. C. Seta of hind femur. D. Hind wing. E. *Barce fraterna banksii*, male, Cuernavaca, Mexico, genital region, lateral view. F. *Barce fraterna banksii*, male from Central Mercedes, Cuba, apical portion of abdomen, lateral view. G. *Barce fraterna banksii*, Cuernavaca, pygophore, seen from behind. H. *Barce fraterna banksii*, Redwood City, California, pygophore, seen from behind. I. *Barce fraterna fraterna*, Oklahoma, pygophore, seen from behind. J. *Barce fraterna banksii*, male, Redwood City, foreleg. K. *Barce fraterna banksii*, male, Central Mercedes, base of posteroventral series of fore femur. L–P. *Barce fraterna banksii*, Redwood City. L. Paramere. M. Phallus, lateral aspect. N. Phallus, seen from behind. O. Claws of foreleg. P. Claw of hind leg. Q–S. *Barce fraterna banksii*, females, Central Mercedes. Q. Genital region, lateral aspect. R. Genital region, dorsal view. S. Different specimen, genital region, dorsal view. T. *Barce fraterna banksii*, female, Guayaquil, Ecuador, genital region, dorsal aspect. U. *Barce uhleri*, claws of foreleg. V. *Barce neglecta*, process of pygophore, lateral view. W–Z, AA–CC. *Barce uhleri*. W. Apex of pygophore, lateral view. X. Foreleg. Y. Paramere. Z. Posterior tarsus. AA. Genital region of male, lateral aspect. BB. Genital region of female, seen from above. CC. Phallus, lateral view.

ing apex of abdomen by less than 1 mm. Mid and hind tarsi as shown in figure 136I.

Forewings reaching to three-fifths of length of abdomen, their venation as shown in figure 136M; basal cell subdivided. Hind wings attaining apex of forewings, their venation as shown in figure 136N.

Abdomen slender, almost parallel-sided.

Male: Seventh tergite (fig. 136J) tongue-shaped, rather coarsely rugose transversely, attaining apex of pygophore. Eighth sternite as shown in figure 136K. Pygophore subrectangular in lateral view (fig. 136K), somewhat compressed laterally, its posterior process short, subrectangular when seen from behind (fig. 136L), strongly curved backward in lateral view (fig. 136K). Parameres not visible from side when *in situ*, slender, rod-shaped, their chaetotaxy as shown in figure 136 O. Phallus as shown in figure 136P–R; membranous structure at point of emergence of endosoma from phallobase complex in shape, provided with several sclerotized regions.

Female: Eighth tergite (fig. 136S, T) subhorizontal, almost twice as long as wide, somewhat depressed on disc, deeply emarginated apically. Ninth tergite vertical, inserted basad of level of apex of eighth tergite, clearly visible from behind (fig. 136V) but not from above, depressed on disc and broadly emarginated behind. Ventral view of genital region as shown in figure 136U.

MATERIAL EXAMINED: United States: Louisiana: New Orleans, July 25, 1944 (R. Alrutz; the American Museum of Natural History), one male holotype, one female allotype; New Orleans (R. H. Browne, the American Museum of Natural History), one baldy damaged specimen, identified as *Ischnonyctes* sp. by McAtee and Malloch.

OBSERVATIONS: This very peculiar species is named for Dr. R. Hussey in recognition of his valuable work on the Hemiptera and the assistance he has given me so unselfishly. As explained above, the very typical genitalia of the male, in addition to other less conspicuous characters, make the inclusion of *husseyi* in *Barce* necessary, even though the shortened pronotum of the winged form does not agree with conditions found in the type species and others, in which the hind lobe of the pronotum covers the mesonotum completely.

Barce neglecta (McAtee and Malloch), new combination

Figure 135V

Metapterus neglectus MCATEE AND MALLOCH, 1925, p. 87, figs. 152–154.

This species is very close to *uhleri*. In addition to the characters given in the key, it differs also by its more slender forelegs. The parameres of the male are pointed apically (not truncate as in *uhleri*); the phallus is very much like that of *uhleri*, but the phallobase is somewhat more slender, and the V-shaped sclerite of the apical portion is not distinct.

DISTRIBUTION: Eastern United States.

TYPE: Male, Staten Island Museum.

Barce scaramuzzai (Wygodzinsky), new combination

Metapterus scaramuzzai WYGODZINSKY, 1951c, p. 123, figs. 17–23.

The type of this species has been reexamined.

DISTRIBUTION: Cuba.

TYPE: Male, Museum of Comparative Zoölogy.

Barce uhleri Nathan Banks

Figure 135U, W–Z, AA–CC

Barce uhleri NATHAN BANKS, 1909, p. 47, fig. 1.
Metapterus uhleri: MCATEE AND MALLOCH, 1925, p. 86, figs. 146, 148–151.
Barce uhleri v. *brunnea* NATHAN BANKS, 1909, p. 47.

The phallus of this species is characterized, among other features, by a V-shaped sclerite, the two arms of which arise from the region where the tubular endosoma emerges from the sclerotized portion of the phallobase (fig. 135CC). As mentioned by McAtee and Malloch (1925), the proportion of winged specimens in this species is small. I have seen none.

DISTRIBUTION: Eastern United States.

TYPE: Museum of Comparative Zoölogy.

Barce werneri, new species

Figure 136W–Z, AA–NN

DESCRIPTION: Micropterous male: Length, 10 mm.; head, 1; thorax 3; abdomen, 6 mm.

Color of holotype: General color piceous, tinged with reddish on head dorsally, pronotum, and last tergite. Head ventrally with a luteous stripe as wide as interocular space. Antennae brown. Rostrum ochraceous. Coxa,


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF
GG
HH
II
JJ
KK
LL
MM
NN

trochanter, and femur of forelegs ochraceous, femur with a few not very distinct flavescent spots. Tibia and tarsi castaneous, former with one subbasal and one submedian annulus flavescent. Mid and hind legs piceous, femur and tibiae with a few narrow, very faint, lighter annuli. Paratype similar, but somewhat lighter-colored, dorsally with irregular and rather conspicuous testaceous pattern; fore femur distinctly annulated with flavescent. Head and thorax smooth, former with some scattered, small, setiferous tubercles, especially on postocular region. Abdomen with delicate herringbone rugosities. Modified setae pointed (fig. 136FF).

Shape of head and rostrum as shown in figure 136X, Y. Clypeus without projection; process of labrum very short. Length of first segment of antennae, 4.2 mm.; relative length of segments, 1/0.8/0.03/0.4.

Thorax as shown in figure 136X, Y. Prothorax cylindrical, short hind lobe with a median longitudinal carina. Mesonotum and metanotum carinate along middle, metanotum as long as wide, half as long as mesonotum, latter with posterior angles somewhat salient; mesonotum and metanotum combined slightly shorter than pronotum.

Forelegs as shown in figure 136AA, relatively stout; tibia three-fifths as long as coxa; femur 12 times as long as maximum width, spined portion occupying its apical three-fifths. Hind femora almost attaining apex of abdomen; tarsus and claws of mid and hind legs as shown in figure 136Z.

Abdomen slightly fusiform (fig. 136CC), its apical portion as shown in figure 136CC, DD, MM. Last tergite irregularly and rather coarsely rugose transversely, slightly surpassing apex of pygophore. Outline of pygophore regularly rounded (fig. 136EE), its posterior projection subrectangular when seen from behind (fig. 136HH), very slender and slightly bent backward in lateral view (fig. 136EE). Parameres slender, not visible from side when *in situ*, their exact shape and chaetotaxy as shown in figure 136GG. Phallus as shown in figure 136II, JJ. Articulatory apparatus large; phallobase slender, elongate; membranous structure of endosoma at point of emergence from phallobase relatively simple.

Macropterous female: Length, 11 mm.

Color pattern like that of paratype male, pattern elements very conspicuous (fig. 136W). Forewings light grayish brown, veins dark, apical discal cell and distal region with irregularly arranged dark spots.

Prothorax as shown in figure 136W. Fore lobe elongate, subcylindrical. Hind lobe reduced but relatively large, covering approximately basal third of mesonotum, with conspicuous, median, longitudinal carina, rugose transversely on disc at each side of median ridge.

Forelegs like those of male. Wings attaining three-fifths of length of abdomen, their venation as shown in figure 136BB; basal cell subdivided. Hind wings attaining apex of forewings.

Genital region as shown in figure 136KK, LL, NN. Eighth tergite subhorizontal, about

---

FIG. 136 (OPPOSITE PAGE). A–V. *Barce husseyi*. A. Head and thorax, dorsal view. B. Head and prothorax, lateral aspect; pattern shown on head only. C. Head, lateroventral view, with pattern. D. Base of series of fore femur. E. Apex of fore tarsus, with claws. F. Foreleg. G. Denticles of under surface of fore tibia. H. Seta of posterior femur. I. Tarsus of hind leg. J. Genital region of male, seen from above. K. Apex of abdomen of male, lateral view. L. Pygophore, seen from behind. M. Forewing. N. Portion of hind wing. O. Paramere. P. Phallus, lateral view. Q. Phallosoma, dorsal aspect. R. Phallosoma, seen from below. S. Genital region of female, lateral view. T. Apex of abdomen of female, seen from above. U. Genital region of female, ventral view. V. Genital region of female, posterior aspect. W–Z, AA–NN. *Barce werneri*. W. Anterior portion of body of female, seen from above, with color pattern. X. Anterior portion of body of male, seen from above. Y. Head and prothorax of male, lateral aspect; color pattern shown on head only. Z. Posterior tarsus. AA. Foreleg. BB. Forewing. CC. Abdomen of male, dorsal view. DD. Apex of abdomen of male, lateral aspect. EE. Posterior portion of pygophore, side view. FF. Seta of posterior femur. GG. Paramere. HH. Apex of pygophore, seen from behind. II. Phallus, lateral view. JJ. Phallus, seen from behind. KK. Genital region of female, seen from above, with color pattern. LL. Genital region of female, seen from behind. MM. Apex of abdomen of female, ventral aspect. NN. Apex of abdomen of female, lateral view.

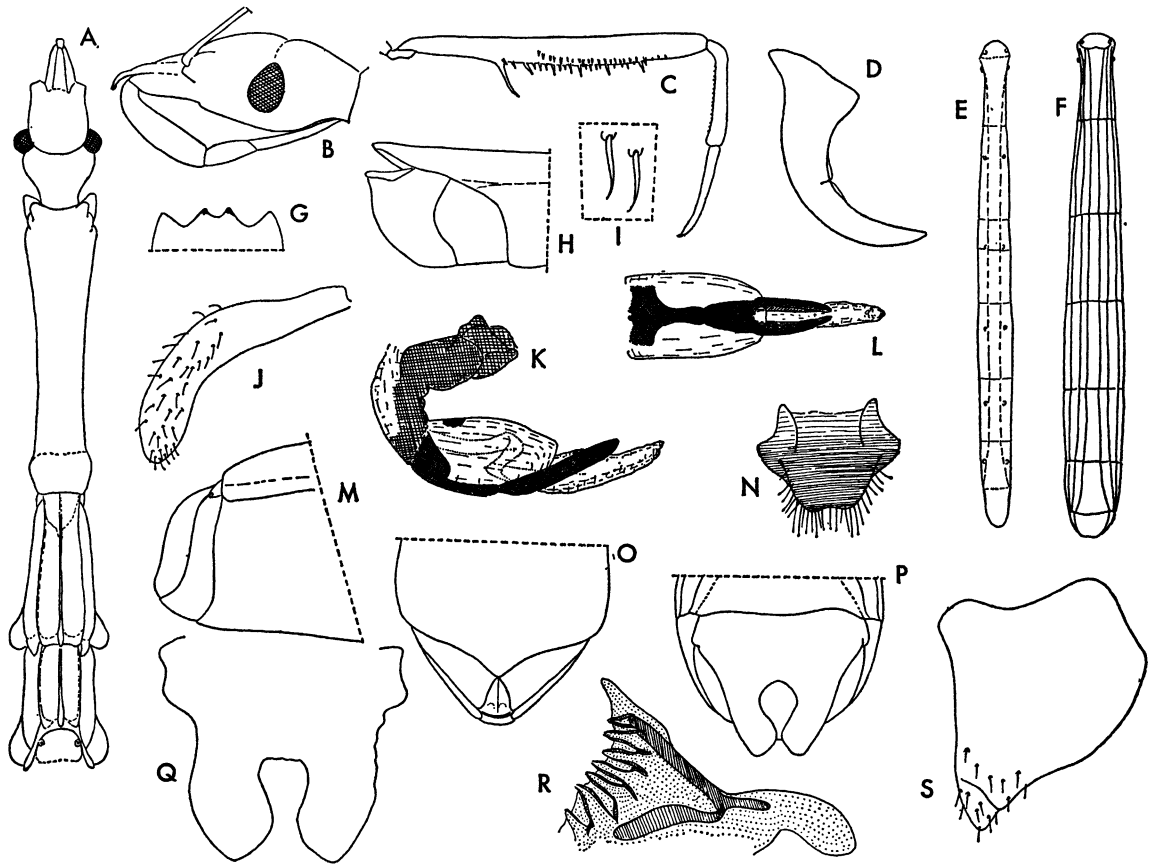


FIG. 137. *Bargylia babinda*. A. Head and thorax of male, dorsal view. B. Head of male, lateral aspect. C. Foreleg; coxa not shown. D. Claw of hind leg. E. Abdomen of male, dorsal aspect. F. Abdomen of female, dorsal aspect. G. Apex of pygophore, seen from behind. H. Genital region of male, lateral view. I. Setae of sternite. J. Paramere. K. Phallus, lateral view. L. Phallosoma, seen from below. M. Genital region of female, lateral view. N. Syngonapophysis. O. Genital region of female, ventral aspect. P. Apex of abdomen of female, seen from behind. Q. Eighth tergite of female, as seen on slide mount. R. Posterior gonapophysis. S. Gonocoxite with gonapophysis.

as long as wide at base, its sides convergent posteriorly, apex distinctly emarginated. Ninth tergite vertical, inserted somewhat basad of level of posterior border of eighth, subtriangular, not depressed on disc (fig. 136LL).

MATERIAL EXAMINED: United States: Louisiana: Harahan, July 8, 1944 (F. G. Werner; University of Arizona), one male holotype; (F. G. Werner; the American Museum of Natural History), one male paratype; Baton Rouge, October, 1950 (Chidester; the American Museum of Natural History), one female. Georgia: Charlton County: Folkston, August 27, 1960 (L. A. Stange; University of California, Davis), one female.

OBSERVATIONS: This species is gratefully named for Dr. Floyd Werner, who has allowed me to study many interesting specimens of the Emesinae in the collections under his care. *Barce werneri* is well characterized by the combination of its external characters and the structure of the phallus of the male. Though I have few doubts about the conspecificity of the micropterous males and winged females that are described above, I consider it prudent not to designate a female allotype at the present time.

BARGYLIA STÅL

Bargylia STÅL, 1865, p. 163.

DESCRIPTION: Apterous. Small to medium-sized species (8.5–16.3 mm.).

Body surface shining, or smooth and distinctly though delicately tuberculate. Setae sparse and short; modified setae clavate or pointed. General color stramineous to piceous.

Anteocular region of head longer than postocular, latter varied in shape in dorsal view. Clypeus with or without spine; labral spine conspicuous, often in shape of a forwardly directed flap. Rostrum slightly or conspicuously bent between first and second segments; first much longer than second, not quite attaining level of anterior border of eyes; third segment longer than second. Eyes very small, not attaining level of dorsal or ventral head surface. Antennae inserted somewhat before center of anteocular region.

Pronotum subcylindrical, slightly narrowed posteriorly; posterior lobe not distinct. Mesonotum shorter than pronotum; metanotum shorter than, or rarely as long as, mesonotum; combined length shorter than, as long as, or longer than, pronotum.

Fore femur with short and long processes bearing short apical spines arranged into two series; series beginning basad of middle of femur. First process of posteroventral series longer than any of remainder, its length surpassing that of diameter of article. Anteroventral series interrupted at base, a single process basad of interruption. Fore tibia slightly or considerably shorter than half of length of femur, ventrally with one series of strongly chitinized denticles. Fore tarsus as long as, or shorter than, tibia, not segmented, strongly sclerotized, virtually bare above and at sides, ventrally with one or two series of adpressed, knifelike setae. Two claws, outer one large, inner one very small; medially incised ventral lamella on outer claw only, poorly developed. Mid and hind legs short, posterior femur attaining or surpassing apex of abdomen. Femora with setae of uniform size; tibiae with numerous short, slender bristles and scattered, short, spinelike setae. Mid and hind tarsi stout, first and third segments subequal in size, second much shorter. Claws slender, medially incised ventral lamella reduced but distinct.

Abdomen parallel-sided, somewhat longer than head and thorax together.

Male: Last tergite tongue-shaped, covering genital segments completely. Parameres rod-shaped, with simple, short setae. Phallus symmetrical, moderately elongate. Basal plates short, fused. Phallobase membranous. Struts elongate, running along ventral surface of phallobase to its apex, fused on basal two-thirds or at middle, separated apically. Endosoma sac- to tube-shaped, coiled when at rest, its surface with tiny regularly arranged spiculae. Opening of phallosoma directed backward.

Female: Eighth tergite large, subhorizontal, truncate or slightly emarginate behind. Ninth smaller, forming continuous surface with eighth, subvertical, visible from above; in one species (*babinda*) eighth tergite very large, posterolateral angles strongly salient, tongue-shaped, ninth sternite considerably reduced, membranous, completely hidden. Gonocoxites and gonapophyses separated; setae of gonocoxites limited to extreme apex of sclerite, very few in number, as long as those of gonapophyses. Syngonapophysis subsemicircular, sclerotized along hind margin only, its disc membranous.

TYPE SPECIES: *Bargylia stali* Wygodzinsky (as *Emesa iuncea* Erichson [misidentification]) (monobasic).

DISTRIBUTION: Australia.

OBSERVATIONS: This genus was originally based upon a misidentified species, considered by Stål (1874) to be *Emesa iuncea* Erichson but which was described in 1951 as *Bargylia stali* by Wygodzinsky (1951b), who submitted to the Secretary of the International Commission of Zoological Nomenclature a petition that *Bargylia stali* Wygodzinsky, 1951, instead of *Emesa iuncea* Erichson, 1842, be declared the type of *Bargylia* Stål.

Wygodzinsky (1958a) synonymized the South African *Bobba* with *Bargylia*, a synonymy apparently accepted by Villiers (1961). Additional evidence now makes it desirable to retain an independent status for *Bobba*, to which all African species described under *Bargylia* are assigned.

KEY TO THE SPECIES OF *Bargylia*

1. Clypeal spine well developed (fig. 139B) . . 2
   Clypeal spine absent 3

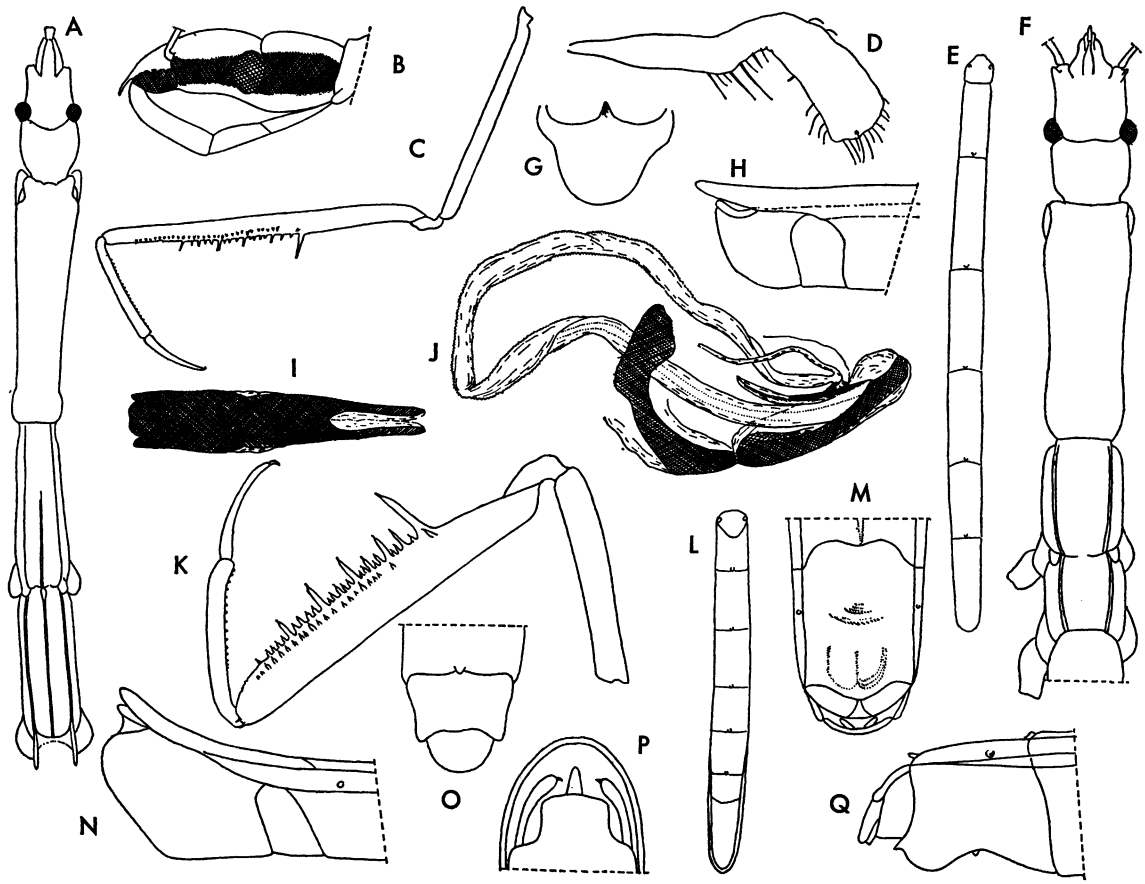


FIG. 138. A–E. *Bargylia longinota*, male. A. Head and thorax, seen from above. B. Head, lateral aspect, with color pattern. C. Foreleg. D. Paramere. E. Abdomen, dorsal view. F. *Bargylia stali*, head and thorax, dorsal view. G–J. *Bargylia longinota*, male. G. Pygophore, seen from behind. H. Genital region, side view. I. Phallosoma, ventral aspect. J. Phallosoma, side view; phallosoma ruptured and endosoma protruding. K–Q. *Bargylia stali*. K. Foreleg. L. Abdomen of male, dorsal view. M. Apex of abdomen of female, seen from below. N. Distal portion of abdomen of male, lateral aspect. O. Genital region of female, dorsal view. P. Apex of pygophore, seen from behind. Q. Apical region of abdomen of female, side view.

2. Distance from base of fore femur to insertion of first spiniferous process shorter than length of said process (fig. 139C); pygophore subsemicircular in lateral view (fig. 139H); ninth tergite of female subtrapezoidal, distinctly constricted before apex (fig. 139U) . . . . . *grossi*

   Distance from base of fore femur to insertion of first spiniferous process slightly larger than length of process (fig. 138K); pygophore elongate, subpentagonal in lateral view (fig. 138N); ninth tergite of female semicircular (fig. 138 O) . . . . . *stali*

3. Mesonotum and metanotum very elongate, combined longer than pronotum (fig. 138A); distance from base of fore femur to insertion of first spiniferous process more than three times its length (fig. 138C); apical projection of pygophore pointed (fig. 138G) . . . . . *longinota*

   Mesonotum and metanotum less elongate, combined shorter than pronotum (fig. 137A); distance from base of fore femur to insertion of first spiniferous process not more than twice length of process (fig. 137C); apical projection of pygophore bifid (fig. 137G) . . . . . *babinda*

Bargylia babinda Wygodzinsky

Figure 137A–S

Bargylia babinda WYGODZINSKY, 1956, p. 198, figs. 1–12.

This species was known previously only from the male (fig. 137A–E, G, H, J–L). A female that I have recently examined agrees with the male in all essential characters, with the exception of the coloring of the mid and hind femora, which bear three light-colored annuli instead of two, as in the male. The abdomen is slender and elongate (fig. 137F). The genitalia are shown in figure 137M–S; they are characterized by the large and apically deeply cleft eighth tergite, with the ninth strongly reduced, largely membranous and completely hidden. The anterior and posterior gonapophyses differ from those of *grossi*, a species very nearly related to the type, *stali*, by several details evident in a comparison of figures 137N, R, S and 139S, T, W. The very different number of processes of the posterior gonapophyses is especially remarkable. In the present species, the modified setae (fig. 137I) are pointed and slightly curved apically, not clavate as in *grossi* (see fig. 139N).

MATERIAL EXAMINED: Australia: Cairns district (A. M. Lea; South Australian Museum), one female allotype.

DISTRIBUTION: Australia (Queensland).

TYPE: Male, Bernice P. Bishop Museum.

Bargylia grossi, new species

Figure 139A–W

DESCRIPTION: Length of body of male, 8.5–9.7; of female, 10–11.5 mm. Male: head, 1.0; prothorax, 1.4; mesothorax, 0.8; metathorax, 0.5; abdomen, 6 mm.

Color variable; general color from castaneous to fulvous. Under surface of head stramineous. Thorax and especially abdomen mottled with testaceous in dark forms, with stramineous in light forms; connexival segments each with one large and one small dark spot. Antennae fulvous, apex of second and entire third and fourth segments darker. Rostrum fulvous, under surface of first and second segments in some cases flavous. Anterior acetabula and forelegs flavous; posterolateral surface of fore coxa with dark, wide, longitudinal stripe; posterolateral surface of fore femora with three to four large fuscous spots which may flow together and form a single dark stripe; anterolateral surface similar. Fore tibia with two short, subbasal, dark annuli, their apical two-thirds entirely dark. Tarsus dark, with only basal fourth yellowish. Spiniferous processes of femur light-colored. Mid and hind legs either rather uniformly castaneous, with annuli not clearly discernible, or stramineous; if stramineous, either almost concolorous, or femora with one wide subapical annulus and one submedian, and tibiae with two short subbasal, fuscous annuli. Apex of tibiae, and tarsi, entirely dark. Dorsal surface of head and thorax strongly granulate, abdomen very faintly so.

Head and rostrum as shown in figure 139A, B. Antennae bare; length of first segment (male), 3.2 mm.; relative length of segments, 1/0.85/0.09/0.26. Clypeal and labral spines well developed.

Thorax as shown in figure 139A. Pronotum slightly more than twice as long as maximum width. Mesonotum without, metanotum with, faint but distinct median longitudinal carina.

Forelegs as shown in figure 139C, D, G. Femur seven times as long as maximum width. Distance from basal spiniferous process of posteroventral series to base of femur smaller than length of process. Large processes of posteroventral series out of line with smaller ones. Denticles of under surface of tibia becoming rather elongate, almost spine-like toward apical portion of article. Spine-like setae of fore tarsus arranged in two series (fig. 139D, G). Mid and hind legs slender, hind femora not or only very slightly surpassing apex of abdomen. Setae of posterior femur as shown in figure 139E.

Abdomen almost parallel-sided, carinate below to middle of seventh sternite. Second through fourth tergites in males with a short, blackish tubercle dorsally at center of hind border; same on second through seventh tergites in females.

Male: Last tergite tongue-shaped, truncate-rounded apically, strongly rugose transversely, somewhat elevated in lateral view (fig. 139H). Exposed portion of eighth sternite almost half as long as pygophore; latter somewhat compressed laterally, three-fourths as high as long in lateral view. Process of superior border truncate. Parameres meeting apically when *in situ* (fig. 139I), their exact shape and chaetotaxy as shown in figure 139J. Phallus as shown in figure 139K, M, O–Q; basal plate struts forming an elongate,

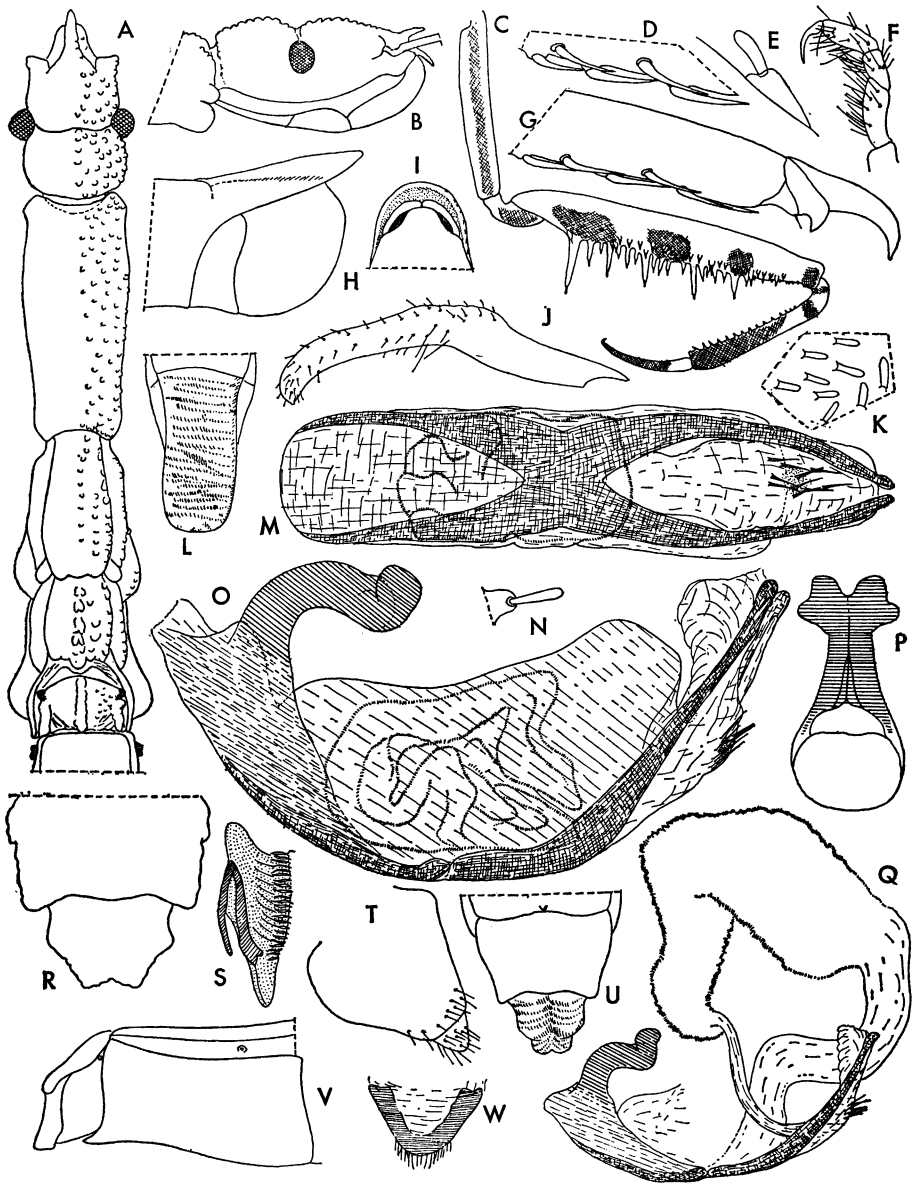


FIG. 139. *Bargylia grossi*. A. Anterior portion of body of male, dorsal view. B. Head of male, lateral aspect. C. Foreleg, with color pattern. D. Spines of under surface of central portion of fore tarsus. E. Seta of hind femur. F. Tarsus of second pair of legs. G. Apex of fore tarsus with claws. H. Genital region of male, lateral aspect. I. Apex of pygophore, seen from behind. J. Paramere. K. Spicules of endosoma. L. Genital region of male, dorsal view. M. Phallosoma, ventral aspect. N. Seta of pygophore. O. Phallus, lateral aspect. P. Articulatory apparatus. Q. Phallus, lateral view; phallosoma ruptured and endosoma protruding. R. Eighth and ninth tergites of female, as seen on slide mount. S. Posterior gonapophysis. T. Gonocoxite with gonapophysis. U. Genital region of female, dorsal view. V. Apex of abdomen of female, lateral aspect. W. Syngonapophysis.

X-shaped sclerite; membranous surface of phallosoma ventrally between apical arms of struts with a pigmented spot from which arise several bristle-like projections. Endosoma folded in center of phallosoma when at rest; relatively short and wide, saclike when freed by dissection (fig. 139Q).

Female: Genital region as shown in figure 139R, U, V. Seventh sternite relatively elongate, only faintly concave in lateral view, lacking special sculpture elements. Eighth tergite with center and posterolateral angles somewhat salient, its sides rounded at base, slightly emarginated on apical half; ninth tergite subtrapezoidal, constricted before apex, latter with a small, but distinct, incision at center; surface of ninth tergite strongly rugose. Genital sclerites as shown in figure 139S, T, W.

MATERIAL EXAMINED: Australia: South Australia: Mt. Lofty, in tussocks (South Australian Museum), one male holotype, one male paratype; Adelaide (A. H. Elston; South Australian Museum), one male paratype; Adelaide, Glenelg (South Australian Museum), one male paratype; Mt. Lofty Ranges, in tussocks (N. B. Tindale; South Australian Museum), one female allotype; Lucindale (Feuerheerdt; South Australian Museum), one female paratype; Pearson Island (Campbell; the American Museum of Natural History), one male paratype; (Campbell; South Australian Museum), one female paratype; Lucindale (A. M. Lea; South Australian Museum), seven nymphs.

OBSERVATIONS: This species, which I take pleasure in naming for Dr. G. F. Gross, hemipterist of the South Australian Museum, is very closely related to *B. stali*. The main differences are found in the pronotum, which is slightly wider in *grossi*, the lack of a spine on the upper border of the pygophore, the latter's more rounded outline in lateral aspect, and the shorter distance between the basal process of the fore femur and its base. Once the phallus of *stali* can be examined, additional differences will probably be found.

Bargylia longinota Wygodzinsky

Figure 138A–E, G–J

Bargylia longinota WYGODZINSKY, 1956, p. 198, figs. 13–22.

DISTRIBUTION: Northern Australia.

TYPE: Male, British Museum (Natural History).

Bargylia stali Wygodzinsky

Figure 138K—Q

Bargylia iuncea: STÅL, 1874, p. 96 (*nec* Erichson, 1842).

Bargylia stali WYGODZINSKY, 1951, p. 612, figs. 1–12.

DISTRIBUTION: Western Australia.

TYPE: Male, Naturhistoriska Riksmuseet.

BERLANDIANA VILLIERS

Berlandiana VILLIERS, 1949a, p. 367.

DESCRIPTION: Apterous. Slender and very elongate, large-sized species (36–42 mm.).

Body surface dull, with conspicuous though small setiferous granulations on head and body. Modified setae very slender, elongately pointed apically. General color from ochraceous to blackish, concolorous to bicolorous, but lacking complex pattern elements.

Head elongate, anteocular and postocular region subequal in size. Postocular region with sides subparallel or slightly converging posteriorly in dorsal view, abruptly constricted before neck. Clypeus somewhat salient, not spined, strongly granulate. Labrum in shape of small projection. Eyes very small, subelliptical in outline. Interocular sulcus not surpassing level of posterior border of eyes. Rostrum straight, slender, first segment not surpassing middle of anteocular region, second slightly shorter than first, attaining level of posterior border of eyes, third longer than first.

Thorax extremely slender and elongate, nota narrowed at middle. Hind lobe of pronotum distinctly marked, not covering mesonotum. Mesonotum somewhat shorter, metanotum from slightly to distinctly longer than pronotum.

Forelegs very delicate and slender. Femur parallel-sided, with spiniferous processes only on apical half. Posteroventral series beginning with very long process, followed by several medium-sized and many very short ones. Anteroventral series interrupted at base, composed of several medium-sized and many very short processes. Apical spines of

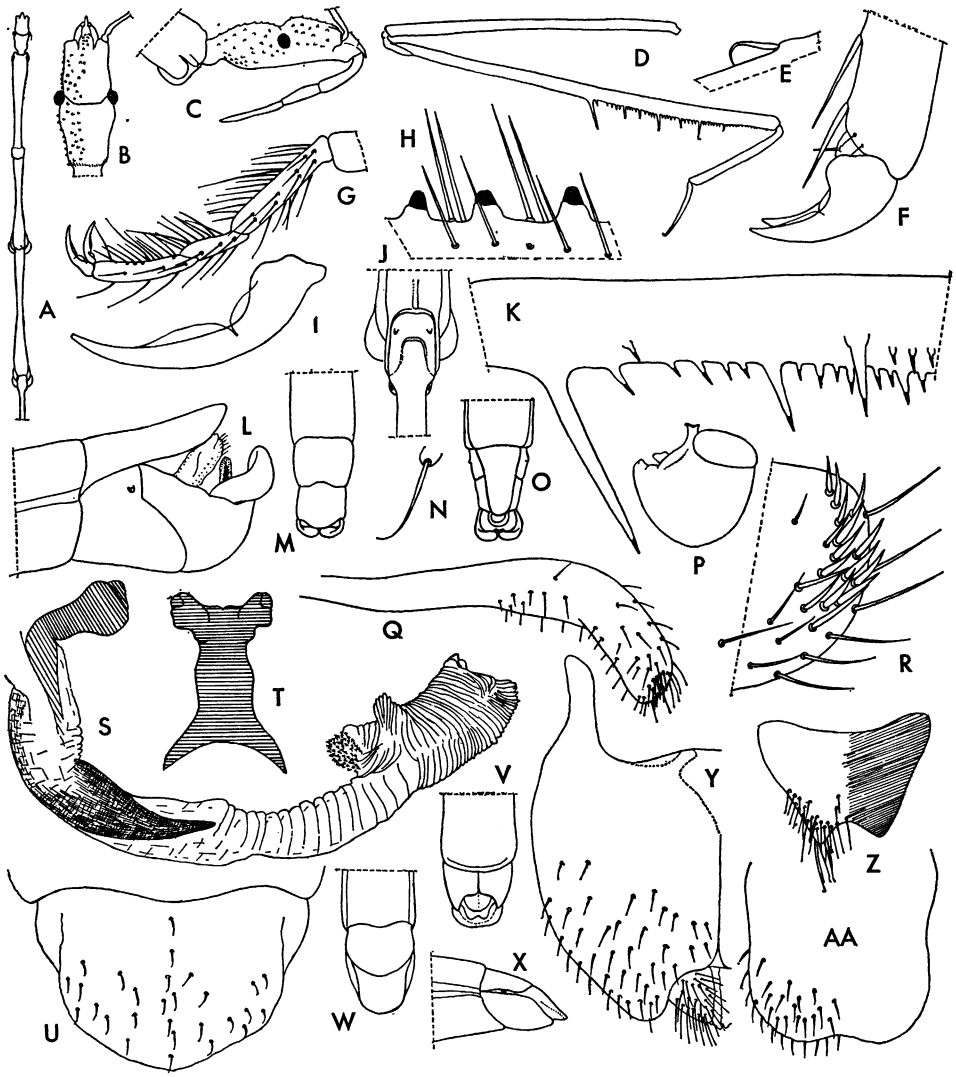


FIG. 140. *Berlandiana decaryi*. A. Anterior portion of body, dorsal view. B. Head, dorsal aspect. C. Head, side view. D. Foreleg. E. Seta of posterior femur. F. Apex of fore tarsus, with claws. G. Posterior tarsus. H. Detail of under surface of fore tibia. I. Claw of hind leg. J. Basal region of abdomen, dorsal view. K. Base of series of fore femur. L. Genital region of male, side view. M. Apex of abdomen of male, seen from below. N. Seta of eighth sternite of male. O. Apex of abdomen of male, seen from above. P. Pygophore, seen from behind, one paramere removed. Q. Paramere. R. Apex of paramere, high magnification. S. Phallus, lateral view. T. Articulatory apparatus. U. Eighth tergite of female, as seen in slide mount. V. Genital region of female, ventral aspect. W. Genital region of female, seen from above. X. Apex of abdomen of female, side view. Y. Gonocoxite with gonapophysis. Z. Syngonapophysis. AA. Ninth tergite of female, as seen in slide mount.

processes relatively elongate and slender. Tibia somewhat shorter than one-third of length of femur, its ventral surface with one series of short, blunt, heavily pigmented denticles. Tarsus about two-thirds as long as tibia, not segmented, curved, virtually bare above and at sides, ventrally with one series of slender, depressed, spiniform setae. Claws somewhat unequal in size, both ventrally with a medially incised low lamella. Mid and hind legs very slender, hind femora surpassing apex of abdomen. Tarsi of mid and hind legs slender, first segment longest, second shortest. Claws very slender, moderately curved, their under surface with a medially incised, low lamella.

Abdomen slender, parallel-sided, keeled below on some segments. Genitalia of both sexes not elevated in relation to rest of abdomen.

Male: Last tergite not quite covering pygophore. Eighth sternite large, emarginated in center behind. Pygophore of medium size, subsemicircular in outline, its posterior projection short, broad at base and narrowed apically, hidden between apices of parameres. Parameres very wide and flattened, moderately curved, apically with a group of short, spiniform setae. Phallus large, symmetrical. Basal plates short, completely fused. Phallosoma subcylindrical, apical half strongly sclerotized laterally, these sclerotizations pointed at apex. Opening of phallosoma posteriorly directed. Endosoma (everted) membranous, tubular at base, widened apically, with several short, symmetrically arranged projections, and a limited area spined.

Female: Eighth and ninth tergites forming a continuous subhorizontal to subvertical surface, broad, truncate behind. Gonocoxites and gonapophyses distinctly separated. Syngonapophysis weakly sclerotized, slightly emarginated behind.

TYPE SPECIES: *Berlandiana picea* Villiers (by original designation).

DISTRIBUTION: Madagascar.

OBSERVATIONS: This genus is well characterized by the combination of features described above. The male genitalia suggest a relationship to the Oriental *Ischnobaena* and *Ischnobaenella.*

KEY TO THE SPECIES OF *Berlandiana*
(ADAPTED FROM VILLIERS, 1949A)

1. Three thoracic segments concolorous . . . 2
   Pronotum reddish, mesonotum and metanotum black . . . . . *bicolor*
2. Thorax reddish or flavous 3
   Thorax piceous . . . . . *picea*
3. Mid and hind legs with conspicuous, light-colored annuli . . . . . *decaryi*
   Mid and hind legs lacking conspicuous annuli 4
4. Last tergite of male emarginated apically . . . . . *hajni*
   Last tergite of male not emarginated apically 5
5. Last tergite of male broadly rounded apically, its sides subparallel, somewhat constricted at middle . . . . . *komorousi*
   Last tergite of male narrowly rounded apically, its sides distinctly converging posteriorly . . . . . *pokoryni*

Berlandiana bicolor Villiers

Berlandiana bicolor VILLIERS, 1949a, p. 268, pp. 279–281.

DISTRIBUTION: Madagascar.

TYPE: Female, Muséum National d'Histoire Naturelle.

Berlandiana decaryi Villiers

Figure 140A–Z, AA

Berlandiana decaryi VILLIERS, 1949a, p. 369.

This species is cavernicolous. It is used here to illustrate the main features of the genus.

MATERIAL EXAMINED: Madagascar: Grotte de Namoraka, September, 1952 (R. Paulian; the American Museum of Natural History), two males, one female.

DISTRIBUTION: Madagascar.

TYPE: Female, Muséum National d'Histoire Naturelle.

Berlandiana hajni (Hoberlandt)

Schidium hajni HOBERLANDT, 1942, p. 145, figs. 13, 18, 19.

Berlandiana hajni: VILLIERS, 1949a, p. 370.

DISTRIBUTION: Madagascar.

TYPE: Male, National Museum, Prague.

Berlandiana komorousi (Hoberlandt)

Schidium komorousi HOBERLANDT, 1942, p. 142. figs. 11, 14, 15, 20–22.

Berlandiana komorousi: VILLIERS, 1949a, p, 370

The species was described by Hoberlandt (1942) as having a single claw on the forelegs, but paratypes that I have examined show two distinct claws, as in all species of the genus.

DISTRIBUTION: Madagascar.

TYPE: Male, National Museum, Prague.

Berlandiana picea Villiers

Berlandiana picea VILLIERS, 1949a, p. 368, figs. 274–278.

DISTRIBUTION: Madagascar.

TYPE: Male, Muséum National d'Histoire Naturelle.

Berlandiana pokornyi (Hoberlandt)

Schidium pokornyi HOBERLANDT, 1942, p. 144, figs. 10, 12, 16, 17, 23–25.

Berlandiana pokornyi: VILLIERS, 1949a, p. 370.

MATERIAL EXAMINED: Madagascar: Ambanja (Hungarian National Museum), one male. This specimen is labeled as a paratype of *komorousi;* its locality label, and its morphological character, correspond to those of *pokornyi.* The specimen has obviously been mislabeled.

DISTRIBUTION: Madagascar.

TYPE: Male, Hungarian National Museum.

BOBBA BERGROTH

Bobba BERGROTH, 1914, p. 10.

DESCRIPTION: Apterous. Small to medium-sized species (6.5–11 mm.).

Body surface dull, strongly tuberculate. Setae sparse and short, modified setae pointed. Color stramineous to piceous.

Anteocular portion of head longer than postocular, latter subrectangular or subsemicircular in dorsal view. Clypeus with or without spine; labral spine conspicuous. Rostrum bent between first and second segments; first much longer than second, approaching or attaining level of anterior border of eyes; third segment longer than second. Eyes very small, not attaining level of dorsal or ventral surface of head. Antennae inserted somewhat before center of head.

Pronotum subcylindrical, narrowed posteriorly; posterior lobe not distinctive. Mesonotum shorter than pronotum, metanotum shorter than mesonotum, both combined slightly shorter or longer than pronotum.

Fore femur with two series of short and long processes bearing short apical spines; series beginning basad of middle of article. First process of posteroventral series longer than any of remainder, its length surpassing diameter of article; most of remaining processes much shorter, some about as long as diameter of femur. Anteroventral series interrupted at base, a single process basad of interruption. Fore tibia not more than half of length of femur, ventrally with one series of strongly chitinized denticles. Fore tarsus as long as, or somewhat shorter than, half of length of tibia, ventrally with one series of strongly adpressed, knifelike setae. Two claws, inner one large, outer one very strongly reduced; ventral, medially incised lamella on large claw only, poorly developed. Mid and hind legs short, posterior femora hardly attaining apex of abdomen. Femora with setae of uniform size; tibiae with numerous short, slender bristles and scattered, short, spinelike setae. Mid and hind tarsi stout, first and third segments subequal in size, second much shorter. Claws slender, medially incised ventral lamella reduced but distinct.

Abdomen fusiform in both sexes, more strongly widened in female.

Male: Last tergite tongue-shaped, covering genitalia completely from above, rounded or pointed apically. Eighth sternite only shortly exposed, narrow in lateral view. Parameres rod-shaped, with simple, short setae. Phallus symmetrical, short. Basal plates separated. Phallosoma short, sclerotized, pointed apically, with subbasal, dorsal projection. Struts long and slender, not fused, continuing into endosoma; latter rather short, with paired sclerites of various shapes and number. Opening of phallosoma backwardly and downwardly directed.

Female: Eighth tergite larger or smaller than ninth, subhorizontal, truncate or somewhat emarginate behind; ninth forming continuous surface with eighth, subvertical.

Gonocoxites and gonapophyses not fused to each other. Setae of gonocoxites limited to apical portion of sclerite, extremely short, very different from long setae of gonapophyses. Syngonapophyses truncate behind, posterolateral angles salient; sclerotized along margins only, disc largely membranous.

TYPE SPECIES: *Bobba culicicapa* Bergroth (monobasic).

DISTRIBUTION: Ethiopian Region (south and east Africa; Madagascar).

OBSERVATIONS: My former synonymization (Wygodzinsky, 1958a) of *Bobba* with *Bargylia* was not based on a careful study of the African species, mainly because it was impossible to examine male genitalia. The structure of the male genitalia is now found to be completely different in both genera, which excludes the hypothesis that one can have been derived from the other, although the possibility of a relatively recent common ancestor is not excluded. On the other hand, it is admitted that females of *Bobba* can be distinguished from those of *Bargylia* generically only by the shape of the abdomen: fusiform rather than linear. The coarse granulation of the species of *Bobba* contrasts with the smooth or only delicately tuberculate condition of the species of *Bargylia*. The very narrow eighth sternite of the males of *Bobba* in all described and undescribed species is also very different from the much wider eighth sternite in *Bargylia*.

In addition to the species enumerated and described below, at least three others, from Kenya and Tanganyika, are before me. The genus is thus well represented in South Africa and especially in the highlands of east Africa, as well as in Madagascar.

KEY TO THE SPECIES OF *Bobba*

1. Clypeal spine well developed (fig. 141GG) . . . . . *africana*
   Clypeal spine absent (fig. 141B, W, EE) . . 2
2. Fore femur (fig. 141FF) very stout, not more than six times as long as maximum width; several of processes of posteroventral series almost as long as diameter of segment . . . . . *culicicapa*
   Fore femur more slender, at least 10 times as long as maximum width (fig. 141W); basal process of posteroventral series at least as long as diameter of femur, all remaining ones much shorter 3
3. Postocular portion of head with sides conspicuously rounded (fig. 141R) . . . *antanemora*
   Postocular portion of head with sides almost straight, slightly converging posteriorly (fig. 141A) 4
4. Length, 12–17 mm.; last tergite of male elliptical; pygophore elongated in lateral view; ninth tergite of female slightly emarginated at hind border (fig. 141DD). . *wygodzinskyi*
   Length, 10.5–12 mm.; last tergite of male pointed apically (fig. 141H); pygophore subsemicircular in lateral view (fig. 141I): ninth tergite of female with knoblike projection at center of hind border (fig. 141Y) . . . . . *villiersi*

Bobba africana (Wygodzinsky), new combination

Figure 141Z, GG

Bargylia africana WYGODZINSKY, 1952c, p. 150, figs. 1–8.

DISTRIBUTION: Transvaal.

TYPE: Female, Transvaal Museum.

Bobba antanemora, new species

Figure 141R, S, V, W, CC

DESCRIPTION: Male: Length of body, 9.7 mm.; head, 1.0; thorax, 2.8; abdomen, 5.9 mm.

General color ochraceous; pattern elements fuscous to piceous. Head dark above and laterally; anteocular and postocular portion lighter at center; ventral surface fuscous. Thorax piceous, nota with a clear-colored, narrow, median, longitudinal stripe. Color pattern of abdomen much like that of *culicicapa* (see fig. 141X), but dark elements less extensive. Antennae piceous. Rostrum ochraceous, darker laterally. Coxae of forelegs fuscous; femora ochraceous below, piceous at sides and above; tibiae and tarsi piceous, latter somewhat lighter at base. Mid and hind legs fuscous, piceous on apical half of femora and basal half of tibiae; a whitish subapical annulus on femora and similar subbasal one on tibiae, these annuli slightly wider than dark adjacent portions of these segments. Head and thorax strongly granulate dorsally, laterally and ventrally; abdomen tuberculate-rugose.

Structure of head and rostrum as shown in figure 141R, W. Tubercles of under surface of head arranged in 1+1 rows along midline. Postocular portion of head wider than long, its sides distinctly rounded. Clypeal spine absent; labral spine long and slender. Antennae bare; length of first segment, 3.5 mm.; relative length of segments, 1/0.8/0.085/0.23.

Thorax as shown in figure 141R. Pronotum slightly more than twice as long as maximum width. Mesonotum without, metanotum with distinct, median, longitudinal carina.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF
GG
HH

Forelegs as shown in figure 141W. Femur about nine times as long as maximum width. Distance from first spiniferous process to base of article equal to length of process; first process longer, all remaining processes shorter than diameter of article. Details of armature of femur, tibia, and tarsus much like those in *villiersi* (see fig. 141C–F). Femora of hind legs not surpassing apex of abdomen.

Abdomen fusiform (much like that of *villiersi*, fig. 141G); tergites lacking conspicuous tubercles at center of hind margin. Shape and sculpture of last tergite as shown in figure 141CC. Sternites carinate along middle. Exposed portion of eighth sternite narrow, one-fourth as long as pygophore. Visible portion of pygophore (fig. 141V) three-fifths as high as long; posterior process very short, pointed. Parameres like those of *villiersi* (see fig. 141M). Phallus as shown in figure 141S; dorsal projection of phallobase membranous; sclerotized elements of endosoma less numerous and less sclerotized than in *villiersi*.

MATERIAL EXAMINED: Madagascar: Antanemora, December 11, 1959, 300 meters (E. S. Ross; Muséum National d'Histoire Naturelle), one male holotype.

Bobba culicicapa Bergroth

Figure 141X, AA, BB, EE, FF, HH

Bobba culicicapa BERGROTH, 1914a, p. 11.

Bargylia culicicapa: WYGODZINSKY, 1958a, p. 116, figs. 18–20.

The illustrations are self-explanatory.

DISTRIBUTION: Zululand.

TYPE: Museum Zoologicum Universitatis.

Bobba villiersi, new species

Figure 141A–Q, T, U, Y

DESCRIPTION: Male and female: Length of male, 10.5–11.0; of female, 12.0 mm.; male: head, 1.2; thorax, 3.1; abdomen, 7.8 mm.

General color rufous to ochraceous, pattern elements piceous. Head and thorax dark at sides; pattern of abdomen like that in *culicicapa* (see fig. 141X), not very conspicuous; eighth sternite, pygophore of male and parameres all black. Antennae castaneous to piceous. Rostrum rufous, darker at sides. Legs of general body color, fore femora irregularly darkened at sides; mid and hind legs concolorous. Head and thorax strongly granulate dorsally, laterally, and ventrally; abdomen tuberculate-rugose.

Structure of head and rostrum as shown in figure 141A, B. Tubercles of ventral surface of head arranged in a band formed by three or four irregular rows, not divided along midline. Postocular region of head wider than long, its sides almost straight, very slightly converging posteriorly. Clypeal spine absent; labral spine long and slender. Antennae bare in both sexes; first segment (male), 4.2 mm.; relative length of segments, 1/0.8/0.12/0.28.

Thorax like that of *antanemora*.

Forelegs as described for *antanemora* and as shown in figure 141C, D, F. Femora of hind legs attaining apex of abdomen, their chaeto-

FIG. 141 (OPPOSITE PAGE). A–Q. *Bobba villiersi*. A. Head, dorsal view. B. Head, lateral aspect. C. Base of fore femur. D. Apex of fore tarsus, with claws. E. Hind tarsus. F. Denticles of under surface of fore tibia. G. Abdomen of male, dorsal view. H. Apex of abdomen of male, as seen from above. I. Apex of abdomen of male, side view. J. Genital region of male, seen from behind. K. Portion of posterior tibia. L. Phallus, lateral view. M. Paramere. N. Apex of abdomen of female, side view. O. Styloid. P. Apex of abdomen of female, seen from below. Q. Abdomen of female, dorsal view. R, S. *Bobba antanemora* male. R. Anterior portion of body, dorsal view. S. Phallus, lateral view; apical two-thirds of articulatory apparatus in ventral view. T, U. *Bobba villiersi*. T. Syngonapophysis. U. Gonocoxite with gonapophysis. V, W. *Bobba antanemora*, male. V. Apex of abdomen, lateral aspect. W. Anterior portion of body, lateral aspect. X. *Bobba culicicapa*, female, general aspect; color pattern shown on third to seventh abdominal segments. Y. *Bobba villiersi*, female, genital region, seen from behind. Z. *Bobba africana*, female, genital region, seen from behind. AA, BB. *Bobba culicicapa*. AA. Base of fore femur. BB. Apex of fore tarsus with claws. CC. *Bobba antanemora*, male, seventh tergite, dorsal view. DD. *Bobba wygodzinskyi*, female, genital segments, posterior view. EE, FF. *Bobba culicicapa*. EE. Head, lateral view. FF. Foreleg. GG. *Bobba africana*, female, head, lateral aspect. HH. *Bobba culicicapa*, female, genital segment, seen from behind.

taxy as shown in figure 141K; hind tarsi, in figure 141E.

Shape of abdomen of male as shown in figure 141G; of female, in 141Q. Sternites carinate along middle. Fourth to seventh tergites each with a small but distinct tubercle at center of hind margin, that on seventh tergite largest.

Male: Last tergite pointed apically (fig. 141E, G). Exposed portion of eighth sternite only one-sixth as long as pygophore; exposed portion of latter four-fifths as long as high (fig. 141I). Posterior process of pygophore very short, pointed, partly covered by parameres (fig. 141J); structure and chaetotaxy of parameres as shown in figure 141M. Phallus as shown in figure 141L; dorsal projection at base of phallosoma sclerotized; endosoma with numerous well-sclerotized elements.

Female: Genital region and sclerites as shown in figure 141N–Q, T, U, Y. Eighth tergite transverse, shorter than ninth, its posterior border virtually straight. Ninth tergite trapezoidal, wider than long, with a median, percurrent, irregularly shaped carina, its hind border with knob-shaped, central projection.

MATERIAL EXAMINED: Tanganyika: 20 miles southwest of Morogoro, November 15, 1957, 450 meters (E. S. Ross and R. E. Leech; the California Academy of Sciences), one female allotype, three males and two female paratypes; (E. S. Ross and R. E. Leech; Muséum National d'Histoire Naturelle), one male holotype; (E. S. Ross and R. E. Leech; the American Museum of Natural History), one male and one female paratypes.

Bobba wygodzinskyi (Villiers), new combination

Figure 141DD

Bargylia wygodzinskyi VILLIERS, 1961, p. 55, figs. 36–40.

DISTRIBUTION: Mozambique.

TYPE: Male, Muséum National d'Histoire Naturelle.

EMESAYA McATEE AND MALLOCH

Emesaya McATEE AND MALLOCH, 1925, p. 74.
Emesa AUCT. (*nec* Fabricius, 1803).

DESCRIPTION: Macropterous. Large to very large, slender species (29–36 mm.).

Body surface dull, in some cases slightly rugose, in none tuberculate or granulose. Setae short, from pointed to rounded apically, on various parts of body distinctly differentiated into microchaetae and macrochaetae, latter surrounded by distinct bare areas. Color from testaceous and reddish to generally dark, body mostly of uniform color, hind lobe of pronotum frequently bordered narrowly with yellow or whitish. Legs broadly annulate.

Head elongate, anteocular and postocular regions of subequal length; anteocular subrectangular; postocular with sides conspicuously convergent posteriorly, somewhat undulate. Clypeus and labrum lacking spines. Eyes small, circular in outline, remote from level of dorsal or ventral surfaces of head. Interocular furrow curved posteriorly, not attaining level of posterior border of eyes. Rostrum slender, segments not conspicuously thickened. First segment extremely short, not reaching beyond level of apex of antenniferous tubercle, second not surpassing level of middle of eyes, third longest; rostrum slightly bent between first and second segments. Antennae inserted near apex of head.

Pronotum elongate, completely covering mesonotum, more or less pedunculate. Fore lobe elongate-clavate, hind lobe somewhat shorter and distinctly wider than fore lobe, elongate subrectangular, not distinctly separated from front lobe. Scutellum and metanotum very small, not spined or tuberculate.

Forelegs slender. Femora virtually parallel-sided. Spined portion about half as long as article, composed of about five large, several medium-sized, and numerous small spiniferous processes, large basal process longest; spines borne on processes very short, but apical half of large processes often heavily pigmented and not easily distinguishable from distal spine. Anteroventral series beginning much distad of posteroventral series, not interrupted at base, composed of several medium-sized, and numerous small, spiniferous processes. Both series continued to apex of article in form of short teeth. Small processes of both series not in line with medium-sized and large processes, inserted somewhat mediad of latter. Fore tibia from one-third to somewhat less than half of length of femur, ventrally with single row of adpressed, almost knifelike denticles. Tarsus about one-third as long as tibia, strongly sclerotized, al-

most bare above and at sides with exception of a few very short, sensory hairs, ventrally with relatively short setae. First segment large; second and third short, subequal in size, both combined slightly shorter than first. Two claws, subequal in size, both somewhat reduced, inner one on under surface with medially incised lamella, outer one with similar though less-developed lamella and one short subbasal tooth. Mid and hind legs slender, posterior femur distinctly surpassing apex of abdomen; femora with setae of uniform size. Tarsi of mid and hind legs with basal segment slightly longer than third, second shortest. First segment ventrally with dense short hairs in addition to ordinary setae, these hairs absent from other segments; third subapically below with 1+1 short spines. Claws slender, distinctly curved, with a well-developed, medially incised, ventral lamella.

Forewings either falling short of, attaining, or somewhat surpassing middle of abdomen, not reaching its apex. Only discal cell present; M and Cu separated basad of cell; M free, not attaining axillary region, rarely connected to Cu by one or two not very distinct cross veins. Pterostigma falling considerably short of wing tip. Hind wings as long as forewings. Hamus abruptly angled toward Sc+R. M-cu cross vein absent; M joining Cu slightly basad of level of caesura, fused to Cu for a relatively short distance. R+M and Cu projecting beyond level of cross vein to wing border; both simple, not connected to each other. Anal lobe four-fifths as long as wing.

Abdomen very slender, sides subparallel; carinate below on most segments. Genitalia of both sexes not elevated in relation to longitudinal axis of body.

Male: Posterior portion of seventh tergite tongue-shaped, falling somewhat short of apex of pygophore. Eighth sternite simple, fully exposed. Pygophore subsemicircular in lateral outline, somewhat compressed laterally, slightly carinate posteriorly, its posterosuperior border usually with a projection varying in shape. Parameres elongate, subclavate, curved, meeting behind. Phallus asymmetrical, of normal size. Articulatory apparatus short. Basal plate struts fused to form an upwardly directed, narrow, tongue-like sclerite, its apex inserted under more strongly chitinized distal portion of phallosoma, which is membranous on its basal two-thirds. Endosoma with several asymmetrical, large, strongly sclerotized, toothlike structures.

Female: Eighth and ninth tergites forming continuous surface. Eighth subsemicircular, subhorizontal; ninth highly varied in shape, somewhat inclined posteriorly, its lateral portion deflexed, occupying a considerable part of lateral surface of genital region. Gonocoxites and gonapophyses distinctly separated. Syngonapophysis rather deeply but narrowly emarginate behind.

TYPE SPECIES: *Ploiaria brevipennis* Say (by original designation).

DISTRIBUTION: Nearctic and Neotropical regions.

OBSERVATIONS: McAtee and Malloch (1925) showed that a new name was necessary for the genus that includes *Ploiaria brevipennis*, *Emesa precatorius*, and their allies.

Emesaya is very uniform in its external morphology and the general structure of the genitalia. The males of numerous species were examined in the course of the present work and were found to possess the same peculiar type of phallus as that described above. Complete evagination of the endosoma could not be accomplished. The figures illustrate the endosoma in a partially evaginated condition obtained rather easily.

McAtee and Malloch (1925) and Wygodzinsky (1945e, 1954b) have introduced some confusion as to the numbering of the last tergites of the female abdomen. As in all other Emesinae, the tergites of the female genital region are the eighth and ninth, not the seventh and eighth. This error is corrected in the following key adapted from those given by McAtee and Malloch (1925) and Wygodzinsky (1954b).

McAtee and Malloch (1925) wrote that the "prothorax in unwinged forms [is] somewhat shorter than meso- and metathorax together. . . ." It is not clear whether they referred to nymphal stages or to apterous forms. No unequivocal report of such forms has been encountered, and no apterous specimens have been seen.

Specimens of this genus have frequently been found on spider webs.

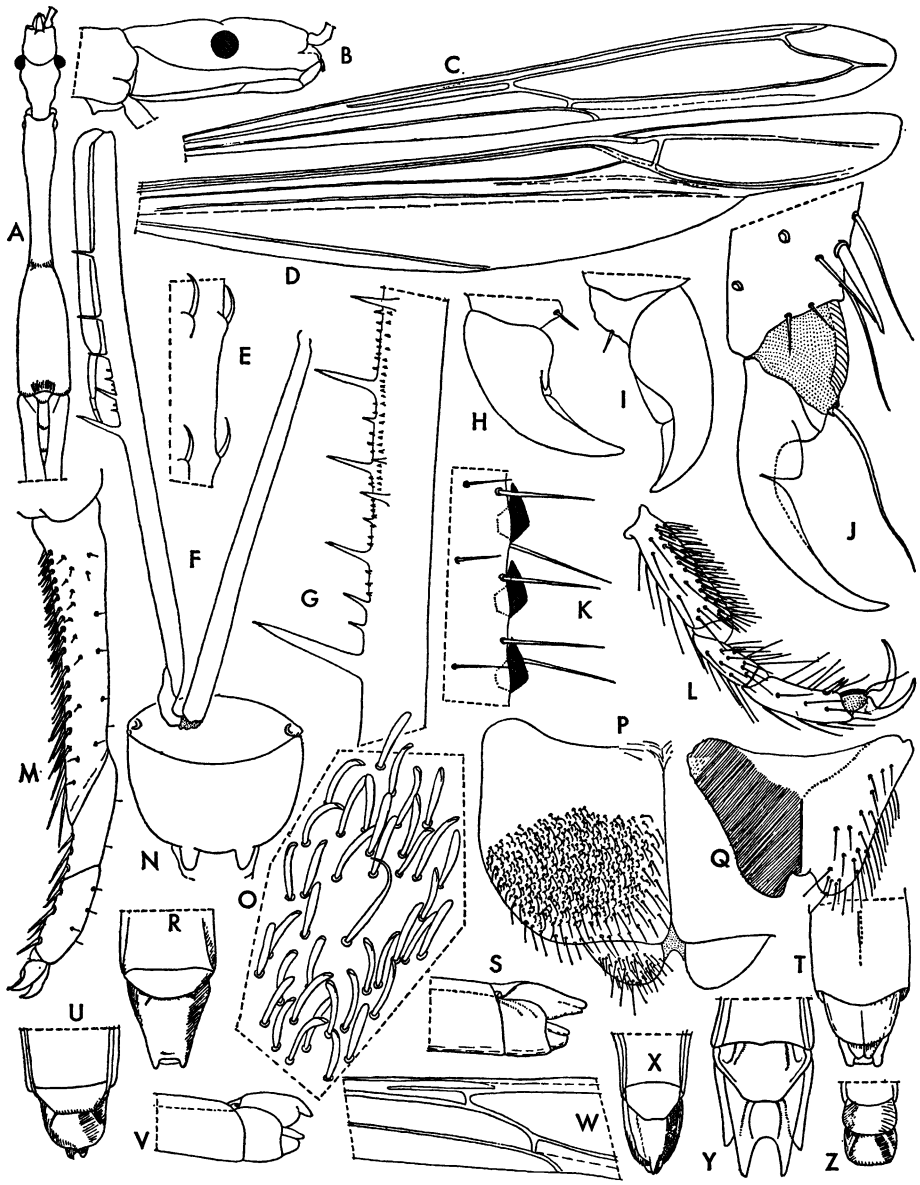


FIG. 142. A–T. *Emesaya brevipennis*. A. Anterior portion of body of male, dorsal view. B. Head of male, lateral aspect. C. Forewing. D. Hind wing. E. Detail of posterior femur. F. Foreleg. G. Base of series of fore femur. H, I. Claws of foreleg. J. Apex of posterior tarsus, with one claw. K. Detail of under surface of fore tibia. L. Tarsus of hind leg. M. Fore tarsus. N. Last tergites, seen from behind. O. Setae of gonocoxite of female. P. Gonocoxite with gonapophysis. Q. Syngonapophysis. R. Genital region of female, seen from above. S. Genital region of female, lateral view. T. Genital region of female, ventral aspect. U. *Emesaya apiculata*, female, apex of abdomen, seen from above. V. *Emesaya pollex*, female, apex of abdomen, side view. W. *Emesaya incisa*, detail of forewing. X. *Emesaya pollex*, female, apex of abdomen, dorsal aspect. Y. *Emesaya incisa*, female, apex of abdomen, seen from above. Z. *Emesaya anduzei*, female, apex of abdomen, dorsal view.

KEY TO THE SPECIES OF *Emesaya*

1. Males 2
   Females 8
2. Posterosuperior border of pygophore with a median vertical projection, in some cases partly hidden by apices of parameres (fig. 143A, D, S) 3
   Posterosuperior border of pygophore lacking said process; in dorsal view with a short, bifid, cephalad-directed, horizontal projection (fig. 143U) . . . . . *manni*
3. Posterosuperior margin of pygophore nearly straight across, bearing on its inner side a process which extends upward and slightly forward between apices of parameres (fig. 143A, D) 7
   Posterosuperior border of pygophore produced, in plane of outer surface, into a process which is not concealed by apices of parameres (fig. 143S) 4
4. Process of pygophore pointed in posterior view 5
   Process of pygophore more or less widened, truncate apically in posterior view (figs. 143 O, S) 6
5. Parameres rounded apically; process of pygophore elongate, spinelike when seen from behind . . . . . *apiculata*
   Parameres notched apically; process of pygophore shortly triangular when seen from behind . . . . . *precatoria*
6. General color stramineous; process of pygophore very wide, notched apically (fig. 143S) . . . . . *incisa*
   General color piceous; process of pygophore much narrower, not notched apically (fig. 143 O) . . . . . *modica*
7. Parameres swollen subbasally and expanded on inner side into triangular subapical lobe (fig. 143T, V) . . . . . *pollex*
   Parameres not swollen subbasally and not expanded into triangular lobe subapically (fig. 143F, H, K) . . . . . *brevipennis*
8. Posterolateral angles of ninth tergite produced considerably beyond middle of hind margin (fig. 142R, Y) 9
   Ninth tergite straight or rounded behind (fig. 142U, X, Z) or posterolateral angles not projecting farther than middle of hind margin 13
9. Eighth tergite with 1+1 distinct, divergent carinae on disc (fig. 142Y) 10
   Eighth tergite without said carinae (fig. 142R) 12
10. Posterolateral projections of ninth tergite very large, enclosing U-shaped space (fig. 142Y) . . . . . *incisa*
    Posterolateral projections of ninth tergite much shorter, central portion of hind border of tergite straight (much as shown in fig. 142R) 11
11. Length of fore femur, about 7.5 mm.; coxa not quite twice as long as head . . . *brevicoxa*
    Length of fore femur, about 9 mm.; fore coxa fully twice as long as head . . . . *banksi*
12. Hind margin of ninth tergite between processes decidedly concave, emargination broadly U-shaped; eighth and ninth tergites with a bare and slightly elevated, median, longitudinal line . . . . . *lineata*
    Hind margin of ninth tergite nearly straight between processes, emargination nearly rectangular (fig. 142R); seventh and eighth tergites lacking line mentioned . . . . . *brevipennis*
13. Hind margin of ninth tergite bisinuate, lateral angles and median point about equally shortly produced . . . . . *modica*
    Hind margin of ninth tergite different . . 14
14. Hind border of ninth tergite straight across (fig. 142Z) . . . . . *anduzei*
    Hind border of ninth tergite projecting at middle (figs. 142U, X) 15
15. Median projection of posterior border of ninth tergite in shape of short point (fig. 142U) . . . . . *apiculata*
    Median portion of posterior border of ninth tergite produced into rather long, keel-like process (fig. 142X) . . . . . *pollex*

Emesaya affinis (Dohrn)

Emesa affinis DOHRN, 1860, p. 222.

Emesaya affinis: MCATEE AND MALLOCH, 1925, p. 77.

This species cannot be placed at the present time. It has not been included in the key.

DISTRIBUTION: Colombia.

TYPE: Unknown.

Emesaya anduzei Wygodzinsky

Figure 142Z

Emesaya anduzei WYGODZINSKY, 1945e, p. 150, figs. 1–8.

The genital region of the female is illustrated here.

MATERIAL EXAMINED: Brazil: Amazonas: Lago de Xibarena, Manaos, January 20, 1956 (Elias and Rappa; Museu Nacional), one female.

DISTRIBUTION: Venezuela; Brazil (Amazonas).

TYPE: Female, Instituto Nacional de Higiene, Caracas.

Emesaya apiculata McAtee and Malloch

Figure 142U

Emesaya apiculata McAtee and Malloch, 1925, p. 77, figs. 131, 131a, 132.

The dorsal aspect of the genital region of the female is figured here.

Material Examined: *British Guiana*: Pakaraima Mountains, upper Ireng River, 1932 [J. G. Myers; British Museum (Natural History)], one male. *Peru*: Valle Chanchamayo, August, 1944, 800 meters (Weyrauch; the American Museum of Natural History), one female.

Distribution: French and British Guiana; Brazil (Amazonas, Mato Grosso, Rio Grande do Sul); Peru; Bolivia.

Type: Male, Carnegie Museum.

Emesaya banksi McAtee and Malloch

Emesaya banksi McAtee and Malloch, 1925, p. 77, figs. 116, 117.

Distribution: United States (Texas); Mexico (Baja California).

Type: Female, Museum of Comparative Zoölogy.

Emesaya brevicoxa (McAtee and Malloch)

Emesa brevicoxa Nathan Banks, 1909, p. 48.
Emesaya brevicoxa: McAtee and Malloch, 1925, p. 77.

The taxonomic status of this species and the foregoing species, both known from females only, is not clear.

Distribution: United States (California).

Type: Female, Museum of Comparative Zoölogy.

Emesaya brevipennis (Say)

Figures 12D, E, K; 13E, F; 142A–T; 143A–K

Cimex longipes De Geer, 1773, p. 352, pl. 35, figs. 16, 17 (preoccupied by *Cimex longipes* Linné, 1767).
Ploiaria brevipennis Say, 1828, p. 105, pl. 47.
Emesa brevipennis: Dohrn, 1860, p. 220.
Emesaya brevipennis: McAtee and Malloch, 1925, p. 78, figs. 121–125, 136–138.
Emesaya brevipennis brevipennis: McAtee and Malloch, 1925, p. 79.
Emesa filum Gray, 1832, p. 786, pl. 97, fig. 3 (*nec* Fabricius).
Emesa pia Amyot and Serville, 1843, p. 394.
Dmesa [*sic*] *choctawana* Kirkaldy, 1909, p. 388.
Emesaya brevipennis australis McAtee and Malloch, 1925, p. 79.
Emesaya brevipennis occidentalis McAtee and Malloch, 1925, p. 80, fig. 126.

This species has been divided by McAtee and Malloch (1925) into three subspecies (*brevipennis brevipennis*, *brevipennis occidentalis*, and *brevipennis australis*), as follows:

1. Processes of ninth tergite of female shorter and more rounded in dorsal view; disc of tergite stramineous, with more copious and longer pubescence, giving it a sericeous appearance . . . . . *brevipennis occidentalis*
   Processes of ninth tergite of female longer, more slender, and pointed; disc of tergite darker, pubescence shorter and more sparse 2
2. Pale annuli on mid and hind legs tending to obsolescence, especially in male, often only knees pale . . . . . *brevipennis australis*
   Full complement of pale leg markings usually evident in both sexes . . . . . *brevipennis brevipennis*

I have compared specimens of *brevipennis australis* with typical *brevipennis brevipennis* and have found no morphological differences. The more important structures of this species are figured here for comparative purposes.

Material Examined: In addition to specimens of *Emesaya brevipennis brevipennis*, the following individuals identified as *brevipennis australis* have been seen: *Mexico:* Tecumán, January 16, 1943 (Bonet; the American Museum of Natural History), one female. *Honduras:* San Pedro Sula, May 30, 1923 (Field Museum expedition; collection Drake), one male. *Nicaragua:* Corinto, January 26, 1930 (the California Academy of Sciences), one male; Consequina Slope, July 7, 1932 (M. Willows, Jr.; the California Academy of Sciences), one male. *Panama:* Canal Zone; Fort Clayton, 1940, 1944, 1945 (K. E. Frick; the California Academy of Sciences), one male, three females; (K. E. Frick; the American Museum of Natural History), one male, one female; 6 miles east of Porto Bello (T. O. Zschokke; the California Academy of Sciences), one male. *Colombia:* Valle: 7 miles west of Sevilla, March 7, 1955 (Schlinger and Ross; the California Academy of Sciences), two females. *Brazil:* Mato Grosso: Koluene, 1948 (J. C. M. Carvalho; Museu Nacional), one male.

FIG. 143. A–K. *Emesaya brevipennis*, male. A. Apex of pygophore, seen from behind. B. Apex of abdomen, ventral aspect. C. Phallus, dorsal view; specimen from Kentucky. D. Apex of abdomen, lateral aspect. E. Apex of pygophore, lateral view. F. Paramere. G. Setae of pygophore. H. Paramere, different aspect. I. Phallus, lateral view; specimen from Iowa. J. Phallus, lateral view; specimen from Kentucky, endosoma slightly less everted than in I. K. Apex of abdomen, dorsal view. L–N. *Emesaya incisa*, male. L. Phallus, lateral aspect. M. Apex of phallosoma, dorsal view. N. Articulatory apparatus. O. *Emesaya modica*, process of pygophore. P. *Emesaya pollex*, phallus, lateral view. Q. *Emesaya incisa*, paramere. R. *Emesaya modica*, paramere. S. *Emesaya incisa*, apex of pygophore, seen from behind. T. *Emesaya pollex*, male, genital region, dorsolateral view. U. *Emesaya manni*, male, apex of pygophore, dorsal view; only one paramere shown. V. *Emesaya pollex*, paramere, setae not shown.

The presence of this species in central Brazil comes as a distinct surprise. However, there is no doubt about the authenticity of this record, especially considering the existence of the species also in Colombia.

DISTRIBUTION: Of *brevipennis brevipennis*, eastern United States, west to Texas; of *brevipennis occidentalis*, United States (California), Mexico (Baja California); of *brevipennis australis*, United States (Gulf states), Mexico and Central America south to Panama, Colombia, Brazil (Mato Grosso).

TYPES: Of *Cimex longipes*, Museum Zoologicum Universitatis; of *brevipennis brevipennis*, unknown; of *brevipennis occidentalis*, male, United States National Museum; of *brevipennis australis*, male, United States National Museum.

Emesaya incisa McAtee and Malloch

Figures 142W, Y; 143L–N, Q, S

Emesaya incisa McATEE AND MALLOCH, 1925, p. 78, figs. 119, 120 [male].

The original description was based on the male. The female was described by Elkins (1951b).

Some details of this species are illustrated here. The articulatory apparatus of the phallus (fig. 143N) is more slender than in the other species examined. The free vein at the base of the forewing (fig. 142W) is conspicuously shorter than in *brevipennis* (fig. 142C).

MATERIAL EXAMINED: United States: Arizona: Tucson, various dates and collectors (University of Arizona), two males, one female; Pima County: Sabino Canyon, June 15, 1957 (C. W. O'Brien; collection Ashlock), one male.

DISTRIBUTION: Southwestern United States; Mexico.

TYPE: Male, United States National Museum.

Emesaya lineata McAtee and Malloch

Emesaya lineata McATEE AND MALLOCH, 1925, p. 81, fig. 127.

DISTRIBUTION: United States (Florida).

TYPE: Female, United States National Museum.

Emesaya manni McAtee and Malloch

Figure 143U

Emesaya manni McATEE AND MALLOCH, 1925, p. 83.

This is the only species of *Emesaya* in which the posterosuperior border of the pygophore lacks an upwardly directed process (fig. 143U).

MATERIAL EXAMINED: Peru: Monson Valley, Tingo María, September 23, 1954 (Schlinger and Ross; the California Academy of Sciences), one male.

DISTRIBUTION: Bolivia; Peru.

TYPE: Male, United States National Museum.

Emesaya modica McAtee and Malloch

Figure 143O, R

Emesaya modica McATEE AND MALLOCH, 1925, p. 81, figs. 128, 129.

The original description of the species, referring only to the female, was supplemented by that of the male by Wygodzinsky (1954b).

Some details of the male genitalia are figured here. The phallus is rather similar to that of *pollex* (see below) in the elongate chitinized projections of what is apparently the apical portion of the endosoma.

DISTRIBUTION: Mexico; Costa Rica; Colombia; Bolivia.

TYPE: Female, United States National Museum.

Emesaya pollex McAtee and Malloch

Figures 142V, X; 143P, T, V

Emesaya pollex McATEE AND MALLOCH, 1925, p. 82, figs. 132a, 133–135.

The very characteristic male and female genitalia are illustrated here.

MATERIAL EXAMINED: *Brazil*: Espiritu Santo: Corrego Itá, November, 1958 (W. Zikán; Instituto de Ecologia e Experimentação Agrícolas), one male; Estado do Rio: Universidade Rural, Kilometer 47, August 27, 1958 (J. Hercio; Instituto de Ecologia e Experimentação Agrícolas), one male. *Argentina*: Chaco: La Escondida (Denier; Museo de La Plata), one female; Corrientes: San Roque, November, 1920 (Bosq; the American Museum of Natural History), one female; Tucumán (Bruch; Museo de La Plata), one female. *Peru:* Vilcanota (Hungarian National Museum), two males.

DISTRIBUTION: Peru; Brazil (from the Amazonas to Rio Grando do Sul); Paraguay; Bolivia; Argentina (as far south as Río Negro).

TYPE: Male, Carnegie Museum.

Emesaya precatoria (Fabricius)

Emesa precatorius FABRICIUS, 1794, p. 263.
Emesaya precatoria: MCATEE AND MALLOCH, 1925, p. 82, figs. 131b, 131c.

DISTRIBUTION: Central America.

TYPE: Male, Universitetets Zoologiske Museum.

EMESELLA DOHRN

Emesella DOHRN, 1859, p. 52 [*nomen nudum*].
Emesella DOHRN, 1860, p. 239.

DESCRIPTION: Apterous. Medium-sized species (11–16 mm.).

Body surface dull, head and thorax granulate. Setae sparse and short; modified setae pointed apically, those of legs and sternites of uniform size. General color dark, with irregular, faint, light pattern; legs dark, spotted and striped with light color.

Head elongate, anteocular and postocular portions of about equal length; anteocular with sides subparallel, postocular with sides converging posteriorly, not abruptly constricted at base. Interocular furrow not attaining level of posterior border of eyes. Clypeus spinelike; labrum closely adherent to base of rostrum, not projecting. Rostrum almost straight, slender; first and second segments short, subequal, first attaining half of length of anteocular region, second not surpassing level of posterior border of eyes, third as long as first and second combined. Eyes small, not attaining level of dorsal or ventral surface of head. Antennae inserted near apex of head.

Prothorax subcylindrical, slightly narrowed posteriorly, its hind lobe extremely short but distinct. Mesothorax and metathorax subcylindrical; mesonotum longer than metanotum, combined subequal to pronotum in length.

Forelegs stout, distinctly widened from base to middle. Unspined portion about as long as basal process. Posteroventral series composed of one very large basal process and several small, and numerous very small, spiniferous processes, apically transformed into short teeth. Anteroventral series beginning distad of base of posteroventral series, not interrupted at base, consisting of setae inserted on small, wartlike projections. Fore tibia about one-third as long as femur, ventrally with one series of strongly sclerotized, short, hooklike denticles. Fore tarsus not segmented, about as long as tibia, strongly chitinized, virtually bare above and at sides, ventrally with two series of adpressed, knifelike setae. Claws well developed, unequal in size, inner one larger, with a weakly developed, medially incised, ventral lamella. Mid and hind legs with femora distinctly nodulose, tibiae faintly so; tarsi with first and third segments subequal in size, second shorter; third somewhat swollen; number of ventral setae not distinctly larger on first segment than on second or third segments. Claws of mid and hind legs slender, regularly curved, ventrally with well-developed, medially incised lamella.

Abdomen relatively short, narrower at base than at middle, posterolateral angles of connexival segments somewhat salient.

Male: Last tergite tongue-shaped, pointed apically, completely covering genitalia from above. Eighth sternite only narrowly exposed. Pygophore subsemicircular but somewhat irregular in outline. Posterior process short, truncate, and slightly emarginate apically in only species examined. Parameres slender, strongly curved apically in only species examined. Phallus symmetrical. Basal plate struts directed backward and upward toward dorsal wall of phallosoma, almost fused on their basal half, strongly divergent on their apical half. Phallosoma largely membranous, with 1+1 narrow, posterodorsal sclerotizations prolonged posteriorly into 1+1 free appendages. Endosoma lacking sclerotized processes, its wall with numerous regularly arranged, small spicules.

Female not seen.

TYPE SPECIES: *Emesella nebulosa* Dohrn (monobasic).

DISTRIBUTION: Neotropical Region (highlands of eastern South America).

OBSERVATIONS: This genus, not well understood until the present time, was included by Wygodzinsky (1954b) in *Ghilianella*. It now becomes obvious that *Emesella*, though related to the *Ghilianella-Ghinallelia* complex,

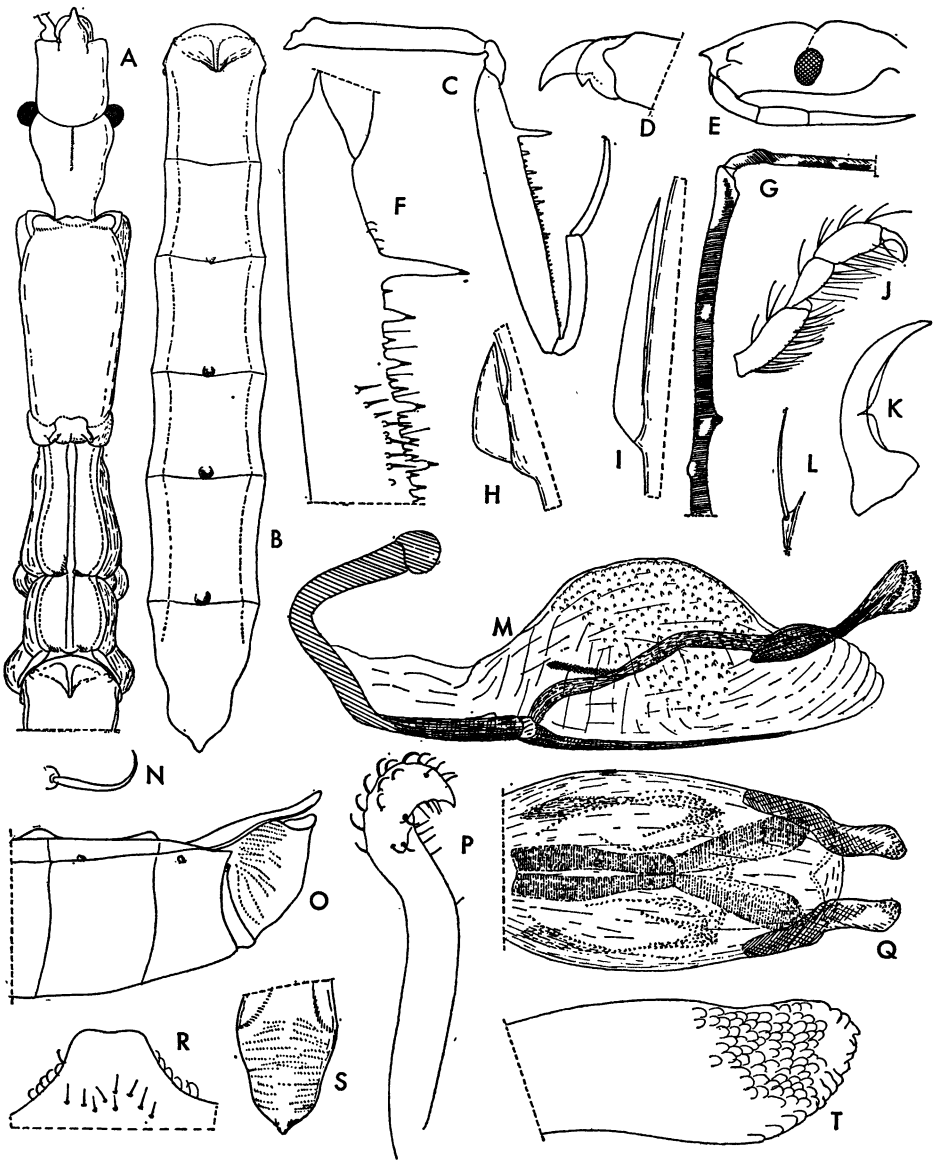


FIG. 144. *Emesella nebulosa*, male. A. Anterior portion of body, dorsal view. B. Abdomen, from above. C. Foreleg. D. Claws of foreleg. E. Head, lateral aspect. F. Base of fore femur. G. Apex of femur and base of tibia of second pair of legs, with color pattern. H. Denticle of ventral surface of fore tibia. I. Spine of under surface of fore tarsus. J. Tarsus of mid leg. K. Claw of hind leg. L. Seta of hind femur. M. Phallus, lateral aspect. N. Seta of sternite. O. Apical portion of abdomen, lateral view. P. Paramere. Q. Phallosoma, dorsal view. R. Apex of pygophore, high magnification. S. Seventh tergite. T. Apex of projection of phallosoma.

occupies a somewhat isolated position. The anteroventral series of the fore femur, which consists of setae only, would ally *Emesella* to *Ghinallelia* rather than to *Ghilianella*, but the symmetrical phallus, with the very peculiar dorsal sclerotizations, and the simple endosoma are quite different from anything so far observed in this group of genera. The unique nodulose mid and hind legs are equally very striking. As they are found in at least two species, I am inclined to consider them as of generic value.

Though several species have been described in *Emesella*, the characters of only one are well known. The preparation of a key does not seem warranted at the present time.

Emesella immitis Bergroth

Emesella immitis BERGROTH, 1906a, p. 312.

The original description leaves some doubt about the generic position of the species, but it is quite probable that this is a true *Emesella*.

DISTRIBUTION: Venezuela.

TYPE: Unknown.

Emesella nebulosa Dohrn

Figure 144A–T

Emesella nebulosa DOHRN, 1859, p. 52 [*nomen nudum*].

Emesella nebulosa: DOHRN, 1860, p. 239.

Ghilianella nebulosa: WYGODZINSKY, 1954b, p. 295, figs. 26–35.

The figures given with the redescription by Wygodzinsky (1954b) are reproduced here with some modifications and additions, especially as to the genitalia. The peculiar dorsal projection at the hind border of the pronotum was not mentioned by Dohrn (1860); it is comparable to that found in *Ghilianella* (*Ploeodonyx*) *angulata*. We do not know if this is a specific or a generic character.

Only the type of the species is known.

DISTRIBUTION: Bolivia.

TYPE: Male, Naturhistorisches Museum, Vienna.

Emesella robusta Dohrn

Emesella robusta DOHRN, 1863, p. 72.

The position of this species is doubtful. The data contained in the original description are inadequate.

DISTRIBUTION: Country unknown.

TYPE: Unknown.

Emesella sp.

MATERIAL EXAMINED: Colombia: Bogotá, Stadtrand, November 16, 1955, 2900 meters (Sturm; the American Museum of Natural History), one nymph; Bogotá, Stadtrand, September 27, 1956 (the American Museum of Natural History), one nymph; Monserrate, 3100 to 3300 meters, December 17, 1955 (Sturm; the American Museum of Natural History), one nymph.

These nymphs are very much like adults of *nebulosa*, with which they agree in the general coloring (though details are, of course, not comparable), the nodulose mid and hind legs, the structure of the forelegs, and the dorsal process of the pronotum. The last-mentioned nymph is 12 mm. long. The adult will be at least 14 mm. long, and is very probably different from that of *nebulosa*.

The altitude at which these specimens were taken is remarkably high and may be indicative of the general habitat of the species of the genus as a whole. For none of the named species is the exact locality given, though at least two come from Andean countries.

GHILIANELLA SPINOLA

Ghilianella SPINOLA, 1850b, pp. 85, 142–143.

Ghilianella AUCT. (part).

Hippokleides KIRKALDY, 1901, p. 55.

Ghilianella (*Ploeodonyx*) MCATEE AND MALLOCH, 1925, p. 99.

Ghilianella (*Lissonyx*) MCATEE AND MALLOCH, 1925, p. 99.

DESCRIPTION: Macropterous or apterous.

Macropterous female: Medium-sized insects (16–17 mm.).

Body surface smooth, dull to subshining. Modified setae delicately pointed apically. General color stramineous; conspicuous markings absent.

Head elongate, somewhat compressed dorsoventrally, anteocular slightly longer than postocular region, latter with sides moderately converging posteriorly in dorsal view, not abruptly constricted at base. Clypeus and labrum without spines, but former salient. Eyes medium-sized; interocular furrow not surpassing level of posterior border of eyes. Rostrum straight, its segments

slender; first not reaching beyond middle of anteocular region, second very slightly longer than first, third distinctly longer. Antennae inserted near apex of head.

Pronotum leaving mesonotum completely exposed; fore lobe subcylindrical, hind lobe very short but distinct, collar-like.

Forelegs relatively stout. Femora parallel-sided, spined portion occupying apical two-thirds of article; posteroventral series beginning with long, spiniferous process, followed by several medium-sized and many very short processes; anteroventral series somewhat shorter than posteroventral, not interrupted at base, composed of several medium-sized and many short processes; spiniferous processes of both series transformed into short teeth only at extreme apex of femur. Fore tibia stout, one-third as long as femur, ventrally with one series of hook-shaped denticles. Tarsus as long as tibia, curved, virtually bare above and at sides, ventrally with two series of adpressed, knifelike setae. Claws unequal in size, inner one large, with a poorly developed, medially incised ventral lamella, outer one small, simple. Hind femur attaining or slightly surpassing apex of abdomen. Mid and hind tarsi with basal segment longest, third slightly shorter, second only about half as long as first; setae of under surface of first segment shorter and more numerous than on second and third. Claws slender, moderately curved, their under surface with medially incised lamella, its basal portion triangularly produced.

Forewings falling short of apex of abdomen, with discal and short subbasal cell. M and Cu completely fused basad of subbasal cell; Rs well developed. Pterostigma not attaining apex of wing tip. Hind wings as long as forewings. Hamus approaching Sc+R only gradually, running more or less parallel to it but not meeting it. R-m cross vein not developed. M meeting Cu slightly basad of level of caesura, two veins fused for a very short distance only. R+M and Cu projecting beyond level of cross vein; R+M bifurcate subbasally, either connected or not beyond cross vein. Anal lobe half as long as wing.

Abdomen parallel-sided, carinate below on most segments. Eighth tergite shorter than wide, horizontal. Ninth tergite much larger than eighth, subvertical, distinctly visible from above. Gonocoxites and gonapophyses separated, former covered for most of their extension by large seventh sternite. Syngonapophysis with posterior angles widely rounded, hind border faintly emarginated.

Apterous form: Medium-sized to very large species (15 to over 30 mm.).

Body surface very faintly shining to dull, head and thorax slightly to heavily tuberculate. Bristles sparse and short, rarely forming patches; modified setae pointed apically. Color stramineous to black, generally uniform, body rarely with light or dark blotches, former in some cases simulated by patches of short hairs; legs in some cases annulated, annuli few in number.

Head elongate, anteocular and postocular portions of about equal length; anteocular with sides subparallel, postocular with sides converging posteriorly in dorsal and lateral views, in no case abruptly constricted at base. Interocular furrow not extending beyond level of posterior border of eyes. Clypeus from more or less salient to spine-shaped; labrum closely adhering to base of rostrum, not projecting. Eyes small to medium-sized. Interocular furrow not extended beyond level of posterior borders of eyes. Rostrum almost straight, its segments slender. First segment not more than half as long as anteocular portion of head; second segment as long as or slightly longer than first, not extended beyond level of posterior border of eyes; third segment as long as first and second combined. Antennae inserted near apex of head.

Prothorax subcylindrical, narrowed shortly before posterior border, its hind lobe short but distinct; mesothorax and metathorax subcylindrical, slightly narrowed toward middle, wider posteriorly than anteriorly; mesonotum generally considerably longer than pronotum, metanotum slightly so; rarely pronotum largest and mesonotum and metanotum successively shorter.

Forelegs with femur generally slender, unspined portion relatively long; femur rarely stouter, unspined portion little longer than basal spiniferous process. Femur normally narrower at base than at middle, rarely wider on basal portion than at somewhat constricted region of beginning to processes. Posteroventral series composed of one large basal spiniferous process and several medium-

sized and numerous small ones, apically transformed into short teeth. Anteroventral series beginning distinctly apicad of base of posteroventral series, not interrupted at base, composed of short and very short spiniferous processes intermixed with long setae. Fore tibia about one-third as long as femur, ventrally with one series of short, hook-shaped denticles. Tarsus not segmented, slightly shorter than or about as long as tibia, strongly sclerotized, virtually bare above and at sides, ventrally with two series of adpressed, knifelike setae. Claws unequal in size, inner one large, with a poorly developed, medially incised ventral lamella, outer one small, simple. Mid and hind tarsi with first and third segments subequal in size, second much shorter; setae of under surface of first segment relatively short and very numerous, those of second and third segment less numerous and more elongate. Claws of mid and hind legs slender, curved, their under surface with well-developed, medially incised lamella, its basal portion frequently more salient than apical.

Shape of abdomen varied, often sexually dimorphic: from long and nearly parallel-sided to clavate, or with a more or less strongly developed subterminal or terminal bulbosity; abdomen either shorter or longer than head and thorax combined.

Male: Seventh tergite from tongue-shaped to apically pointed, covering genital segments from above. Eighth sternite covered by seventh to a varied degree. Pygophore from semicircular to irregular in outline in lateral view; process of posterosuperior border frequently small, hidden by parameres; in some species, posterior border of pygophore lowered and process large, hook-shaped, fully exposed in lateral view; process generally but not invariably truncate or even bifid apically when seen from behind. Parameres short, varying in shape, with numerous setae but without spines. Phallus symmetrical; basal plate struts directed toward dorsal wall of phallobase, fused for most of their length, separated only apically. Dorsal sclerotization of phallobase well developed, in some cases divided into two lateral components; ventral sclerotization of phallosoma absent, or in shape of two subparallel bands. Endosoma wall covered with very numerous, small, regularly arranged spiculae; endosoma processes various in number, centrally situated; generally two heavily sclerotized processes, delicately serrate apically; rarely only one, then coarsely serrate.

Female: Eighth and ninth tergite forming a continuous surface, from slightly inclined to almost vertical, variously and often conspicuously sculptured; eighth tergite not larger than ninth. Gonocoxites and gonapophyses like those of winged form. Syngonapophysis not emarginated apically.

TYPE SPECIES: Of *Ghilianella*, *Ghilianella filiventris* Spinola (monobasic); of *Hippokleides*, *Hippokleides horsti* (Kirkaldy); of *Ghilianella* (*Ploeodonyx*), *Ghilianella insidiatrix* Bergroth; of *Lissonyx*, *Emesa angulata* Uhler.

DISTRIBUTION: Neotropical Region.

OBSERVATIONS: McAtee and Malloch (1925) divided the large genus *Ghilianella* into three subgenera, as follows:

1. Claws of fore tarsus two, inner short, closely applied to base of outer . . . . . Subgenus *Ghilianella* Spinola
   Claws of fore tarsus single 2
2. Claw separated from tarsus by a suture: fore femur rather slender as a whole, but notably thicker near base than at first strong spine . . . . . Subgenus *Ploeodonyx* McAtee and Malloch; type species, *Ghilianella insidiatrix* Bergroth
   Claw entirely fused with tarsus; fore femur rather stout, little if any thicker at base than at first strong spine; hind margin of prothorax with two rather long, blunt, divergent, teatlike processes . . . . . Subgenus *Lissonyx* McAtee and Malloch; type species, *Emesa angulata* Uhler

The claw of the foreleg of *angulata* is not entirely fused with the tarsus, as is visible under high magnification (fig. 148F). On the other hand, *Ploeodonyx* and *Lissonyx* share a peculiarly modified phallosoma characterized by a single sawlike endosoma process (fig. 148K, R) which differs from conditions found in *filiventris* and allies. I believe that *angulata*, *insidiatrix*, and allies are intimately related and constitute a single superspecific group, (*Ploeodonyx*) different from the typical subgenus (*Ghilianella*). Future work will show if *Ploeodonyx* deserves generic rank.

Furthermore, McAtee and Malloch divided the subgenus *Ghilianella* into two unnamed groups, as follows:

Inner row of armature of fore femur consisting of hairs or bristles which may or may not arise from wartlike bases; usually a single spine at apical end of series . . . . . first group
Inner row of armature of fore femur consisting of spines (which may alternate large and small or be almost equal in size) and between them longer fine hairs . . . . . second group

Research carried out during the preparation of the present monograph has shown that males belonging to the first group have highly asymmetrical phalli and those belonging to the second group symmetrical phalli. The correlation of apomorphic characters in the first group warrants independent generic status. As the type species of *Ghilianella* (*filiventris*) belongs to the second group, the generic name *Ghilianella* has been retained for the latter assemblage. The apomorphic group is described below as a new genus (*Ghinallelia*).

Until the present time, *Ghilianella* has been considered to consist exclusively of apterous species. A newly discovered winged species (*borgmeieri*), though known from females only, is considered to be congeneric with the otherwise apterous *Ghilianella* with which it agrees in all essential details, differing only (in addition to the presence of wings and the associated modifications in the structure of the thorax) by the smooth body surface.

Without having actually examined all the species placed now in *Ghilianella*, *sensu stricto*, I am inclined to consider them as truly belonging to a well-defined group, with the possible exceptions of *annectens*, *truncata*, and *peruviana*, which differ from the remaining species by the different proportions of the thoracic nota and the structure of the forelegs. Until males can be examined (only females have been described until now), the position of these species remains somewhat doubtful.

The distribution pattern of the aggregates discussed above seems significant. *Ghilianella* (*Ghilianella*) covers an area, occupied mostly by rain forest, extending from the Yungas of Bolivia to the mouth of the Amazon and as far north as Guatemala. The single winged species, *borgmeieri*, occurs outside the range of the apterous forms, in extreme southeastern Brazil. *Ghilianella* (*Ploeodonyx*) is found only in the Guianas and the Windward Islands of the Lesser Antilles. *Ghinallelia* ranges much more widely, from northern Argentina to as far north as Florida. Though it seems to be absent from Central America, the genus is quite abundant in the West Indies.

Key to the Species of *Ghilianella*

1. Fore femur distinctly constricted at level of base of series of spiniferous processes (fig. 148G, S); forelegs with only one claw (fig. 148F) . . . *Ghilianella* (*Ploeodonyx*), 2
   Fore femur not constricted at level of base of series of spines (figs. 145C; 146C); forelegs with two claws (figs. 145E; 146F) . . . . . *Ghilianella* (*Ghilianella*), 6
2. Fore femur (fig. 148G) rather stout, only slightly thicker at base than at level of basal process of posteroventral series; hind lobe of pronotum with 1+1 small, pointed processes (fig. 148E) . . . . . *angulata*
   Fore femur (fig. 148S) rather slender, but notably thicker at base than just before level of basal process of posteroventral series 3
3. Male; genitalia as shown in figure 148P–R . . . . . *insidiatrix*
   Females 4
4. Posterior margin of sixth tergite strongly tuberculate at center 5
   Posterior margin of sixth tergite lacking distinct tubercle . . . . . *glabrata*
5. Disc of eighth tergite prominently elevated at each side of wide, median sulcus; ninth tergite convex at center, its margin elevated, very slightly corrugate . . . . . *insidiatrix*
   Eighth and ninth tergites with discs depressed and margins elevated, each longitudinally carinate and transversely corrugate . . . . . *amicula*
6. Males 7
   Females 35
7. Mesothorax shorter than, or little if any longer than, prothorax; abdomen usually widened gradually from base 8
   Mesothorax distinctly longer than prothorax (fig. 146A); shape of abdomen various .11
8. Abdomen with subapical bulbosity; apical process of pygophore large, curved forward . . . . . *gibbiventris*
   Abdomen parallel-sided; if some segment wider, then only slightly so 9
9. Head and thorax conspicuously granulate; parameres very large, subtriangular . .10
   Head and thorax very sparsely granulate; parameres not large and not subtriangular . . . . . *sulcata*

10. Pygophore projecting posteriorly into conspicuous hook standing distinctly free of pygophore; last abdominal tergite elongate, pointed apically, surpassing level of posterior border of pygophore . . . . . *spinicaudata*
Pygophore not as above; last abdominal tergite only slightly salient behind in middle, its apex falling considerably short of level of posterior border of pygophore . . . . . *megharpacta*
11. Abdomen with abrupt bulbous swelling behind middle (figs. 146A; 147A) 12
Abdomen lacking bulbous swelling behind middle 29
12. Spine between antennae well developed, acute; head and prothorax usually distinctly granulose; parameres generally lacking rounded notch in upper or lower margin 13
Interantennal spine not developed, reduced to a mere blunt wart; head and prothorax only slightly granulose; parameres elongate, obtriangular, with notch at least in upper margin 26
13. Process of pygophore small, visible only with high magnification; parameres entirely filling space between process and margin of pygophore 14
Process of pygophore hooklike, space between margin and process not entirely filled by parameres (fig. 148C) 24
14. Fifth tergite bearing pair of strongly divergent, long, conical horns (fig. 147A) . .15
Such horns absent 16
15. Horns more vertical, distance between tips 5 mm. (fig. 147A) . . . . . *mirabilis*
Horns more flattened, distance between tips 2.5 mm. . . . . *brevicornis*
16. Seventh tergite short, sixth entirely incorporated into bulbosity which thus appears almost terminal (figs. 146M, P) 17
Seventh tergite long, sixth not wholly incorporated into bulbosity which is distinctly subterminal 18
17. Sixth tergite more than half as long as fifth, with smaller lateral elevations similar to those of fifth (fig. 146M, P) . *filiventris*
Sixth tergite less than half as long as fifth, without elevations . . . . . *atriclava*
18. Elevations of fifth tergite distinctly inside lateral margins of disc . . . *approximata*
Elevations of fifth tergite on lateral margins of disc, margins passing over as carinae . .19
19. Elevations of fifth tergite pointed, nearer posterior margin; parameres long and slender, slightly upcurved apically; abdomen not spotted 20
Elevations of fifth tergite more rounded or squared, situated at or close to middle; shape of parameres different 21
20. Sixth segment more involved in bulbosity; seventh tergite apiculate and surpassing paramere. . . . . *recondita*
Sixth segment less involved in bulbosity; seventh tergite not apiculate and not surpassing parameres . . . . . *bulbifera*
21. Seventh tergite surpassing pypgophore by more than length of parameres; abdomen not spotted . . . . . *puncticauda*
Seventh tergite slightly or not surpassing apex of pygophore; abdomen spotted . .22
22. Abdomen with 12 large, pilose spots, four of these on sixth segment . . . . . *signata*
Abdomen with 10 or 14 pilose spots, none on sixth segment 23
23. Abdomen with 14 spots; fifth sternite with two more extensive spots near anterior margin and four smaller ones on apical margin . . . . . *grapta*
Abdomen with 10 spots; fifth sternite with only two patches on posterior margin . . . . . *ignorata*
24. Seventh tergite lacking longitudinal carina, its apex projecting little if any beyond pygophore; apical process of pygophore strongly curved at base, standing well clear of pygophore, visible as hook to unaided eye (fig. 148C) . . . . . *uncinata*
Seventh tergite longitudinally carinate on apical half, well projecting beyond apex of pygophore; process of pygophore relatively small, not much curved at base and not standing distinctly clear of pygophore, thus visible as hook only under moderate magnification 25
25. Sixth tergite not longer than wide at base . . . . . *subglobulata*
Sixth tergite distinctly longer than wide at base . . . . . *globulata*
26. Prothorax with two long spines above near middle (pl. 3, fig. 6) . . . . . *spinata*
These spines absent 27
27. Upper border of pygophore with large process standing clear from base . . . *fenestrata*
Process of upper border of pygophore very small, hidden 28
28. Parameres with a deep emargination on upper margin subapically, lower margin entire; fifth sternite with regular, microscopical, longitudinally, and slightly outwardly directed striae . . . . . *strigata*
Parameres with deep, rounded emargination on upper margin subapically, and deep incision about opposite on lower margin; fifth sternite lacking regular striae, granular,

granules grouped partially in irregular transverse rows . . . . . *patruela*

29. Abdomen as wide at level of pygophore as at any point proximad 30
Abdomen distinctly widest at level of third or fourth segment; seventh tergite remarkably slender and elongate, projecting beyond apex of pygophore at least by length of latter 34

30. Pygophore almost annular, its terminal hook large, flanked on each side by a space not filled by broadly triangular parameres; seventh tergite not especially narrowed subapically, apex a strong point projecting well beyond pygophore . . . . *apiculata*
Pygophore longer, apical hook small, seventh tergite different 31

31. Pygophore slightly inflated, its height hardly greater than that of abdomen generally 32
Pygophore distinctly inflated, its height notably greater than that of rest of abdomen 33

32. Parameres oblong, almost truncate apically, slightly beveled at inferior angle . . *ica*
Parameres broad basally, rather pointed apically, superior angle sloped with a long bevel . . . . . *pachitea*

33. Seventh tergite longer, much narrowed and slightly corrugated transversely subapically, apex pointed and slightly keeled . . . . . *aracataca*
Seventh tergite shorter, only slightly narrowed and faintly transversely wrinkled subapically, its apex triangular, bluntly pointed . . . . . *colona*

34. Abdomen widest at fourth segment, each tergite with pair of small round spots of pale yellow pile on hind margin; spiracles yellow . . . . . *assanutrix*
Abdomen widest at fifth segment, terga lacking pilose spots; spiracles blackish . . . . . *gladiator*

35. Winged; genitalia as shown in figure 145N–P . . . . . *borgmeieri*
Apterous; genitalia different 36

36. Mesonotum not longer than pronotum . .37
Mesonotum longer than pronotum 42

37. Posterior angles of at least four tergites more or less ampliate or produced, outline of abdomen dorsally not a continuous straight or curved line 38
Posterior angles of tergites, except in some cases fifth, sixth, or seventh, not produced, outline of abdomen dorsally forming continuous straight or curved line. . *perversa*

38. Seventh tergite narrower at base than at apex, posterolateral angles sharply produced, with long, spinelike, median projection . . . . . *spinicaudata*
Structure of seventh tergite different . . .39

39. Angulations of tergites less pronounced; apex of sixth tergite scarcely wider than that of seventh 40
Angulations of tergites more pronounced; apex of sixth tergite notably wider than that of seventh 41

40. Center of hind margin of sixth tergite with strong tubercle; head and thorax strongly granulate; length, more than 21 mm. . . . . *peruviana*
Sixth tergite lacking such tubercle; head and thorax not granulate; length, less than 15 mm.. . . . . *calva*

41. Elevated margins of ninth tergite produced apically as distinct spines . . .*annectens*
Elevated margins of ninth tergite not forming spines . . . . . *truncata*

42. Abdomen with bulbous swelling beyond middle and prominent elevations on either fifth or sixth tergite 43
Abdomen without bulbous swelling or lateral elevations on fifth or sixth tergite . . .57

43. Head, all thoracic nota, and fifth and sixth abdominal tergites with long spines (pl. 3, fig. 6) . . . . . *spinata*
Spines smaller in number or completely absent 44

44. Sixth tergite as wide as or wider than fifth, bearing large, median tubercle 45
Fifth tergite widest; its sides prominently elevated before hind margin, usually standing above connexivum 46

45. Fifth tergite about equal in length to its width at hind margin . . . . . *pendula*
Fifth tergite about twice as long as its width at hind margin . . . . . *cuneata*

46. Sixth tergite with prominent, median, falcate tubercle on hind margin . . . . . *bethei*
Sixth tergite lacking large, median tubercle, though fifth or sixth may be more or less elevated at middle of hind margin . . .47

47. Fifth tergite with pair of long, divergent, conical horns, each nearly equal in length to width of tergite . . . . . *mirabilis*
Fifth tergite lacking such horns 48

48. Elevations of fifth tergite distinctly inside lateral margin of disc. 49
Elevations of fifth tergite on lateral margins of disc 50

49. Seventh tergite wider than long . . *clavellata*
Seventh tergite as long as wide (fig. 147N) . . . . . *approximata*

50. Abdomen with one pair or more of large, pale, pilose spots on dorsum and venter . . .51
Abdomen lacking pale pilose spots 52

51. Yellow spots extensive; sixth segment with spots . . . . . *signata*
Yellow spots small; sixth segment lacking spots . . . . . *grapta*
52. Eighth tergite much shorter than wide . .53
Eighth tergite as long as or longer than wide 55
53. Posterior angles of seventh tergite produced distinctly beyond middle of posterior margin which is merely convex and not at all tuberculate; ninth tergite with lateral and shorter median ridges . . . *subglobulata*
Posterior angles of seventh tergite produced no farther than median convexity of hind margin 54
54. Posterior border of seventh tergite tuberculate, eighth nearly semicircular; ninth tergite with lateral margins elevated apically and with long, median ridge . . . . . *globulata*
Posterior border of seventh tergite not tuberculate; eighth trapezoidal; median elevation of ninth tergite anchor-shaped, arms passing under lateral elevations . . . . . *puncticauda*
55. Posterolateral angles of seventh tergite distinctly produced beyond middle of hind margin which is not tuberculate . . . . . *gladiator*
Posterolateral angles of seventh tergite produced no farther than median convexity of hind margin which is slightly tuberculate 56
56. Seventh sternite about twice as long on median line as sixth, apically with broad, convex process which is slightly emarginate medially . . . . . *perigynium*
Seventh sternite only a third longer than sixth, somewhat angulate apically . . . . . *recondita*
57. Eighth and ninth tergite each with prominent, median, longitudinal ridge; seventh sternite at least one and a half times as long as sixth along median line, latter with very deep, median concavity on hind margin . . . . . *aracataca*
Different combination of characters . .58
58. Seventh tergite with posterior angles produced as divergent acute processes; other tergites ornamented on hind margins with pair of spots of golden pubescence; abdomen boat-shaped. . . . . *assanutrix*
Posterior angles of seventh tergite not so produced; abdomen not so ornamented . .59
59. Sixth tergite with prominent, median elevation or tubercle on hind margin 60
Sixth tergite with no more than wartlike elevation on hind margin, or lacking elevation 62
60. Elevation of sixth tergite very large and broad, hoodlike, with small, wartlike projection on its apical margin . . *calymmata*
Elevation of sixth tergite smaller, conical 61
61. Ninth tergite with long and wide median ridge . . . . . *panamana*
Ninth tergite with short, narrow, median ridge . . . . . *obesa*
62. Seventh sternite distinctly produced at middle of hind margin 63
Seventh sternite not produced at middle of hind margin . . . . . *filiventris*
63. Seventh tergite much longer than wide; center of hind margin conspicuously declivate, lateral angles prominently acute . . . . . *stipitata*
Seventh tergite little longer than wide, hind margin not declivate medially, almost straight across, lateral angles and median point very slightly produced . . *similata*

For the study of this genus and of *Ghinallelia*, the important papers by McAtee and Malloch (1925) and Maldonado (1960) should be consulted.

1. GHILIANELLA (GHILIANELLA) Spinola

Ghilianella annectens McAtee and Malloch

Ghilianella annectens McAtee and Malloch, 1925, p. 125, figs. 210–212.
Emesa angulata Uhler, 1893, p. 717 (part).

Material Examined: Panama: Canal Zone: Barro Colorado Island, February 10, 1955 (Rettenmeyer; the University of Kansas), one female.

Distribution: Panama.

Type: Female, United States National Museum.

Ghilianella apiculata McAtee and Malloch

Ghilianella apiculata McAtee and Malloch, 1925, p. 111, fig. 180.

Distribution: Dominican Republic.

Type: Male, United States National Museum.

Ghilianella approximata McAtee and Malloch

Figure 147K, L, N–R

Ghilianella approximata McAtee and Malloch, 1925, p. 117.

The structure of the tarsi of all legs is like that of *filiventris* (see fig. 146C-J); the para-

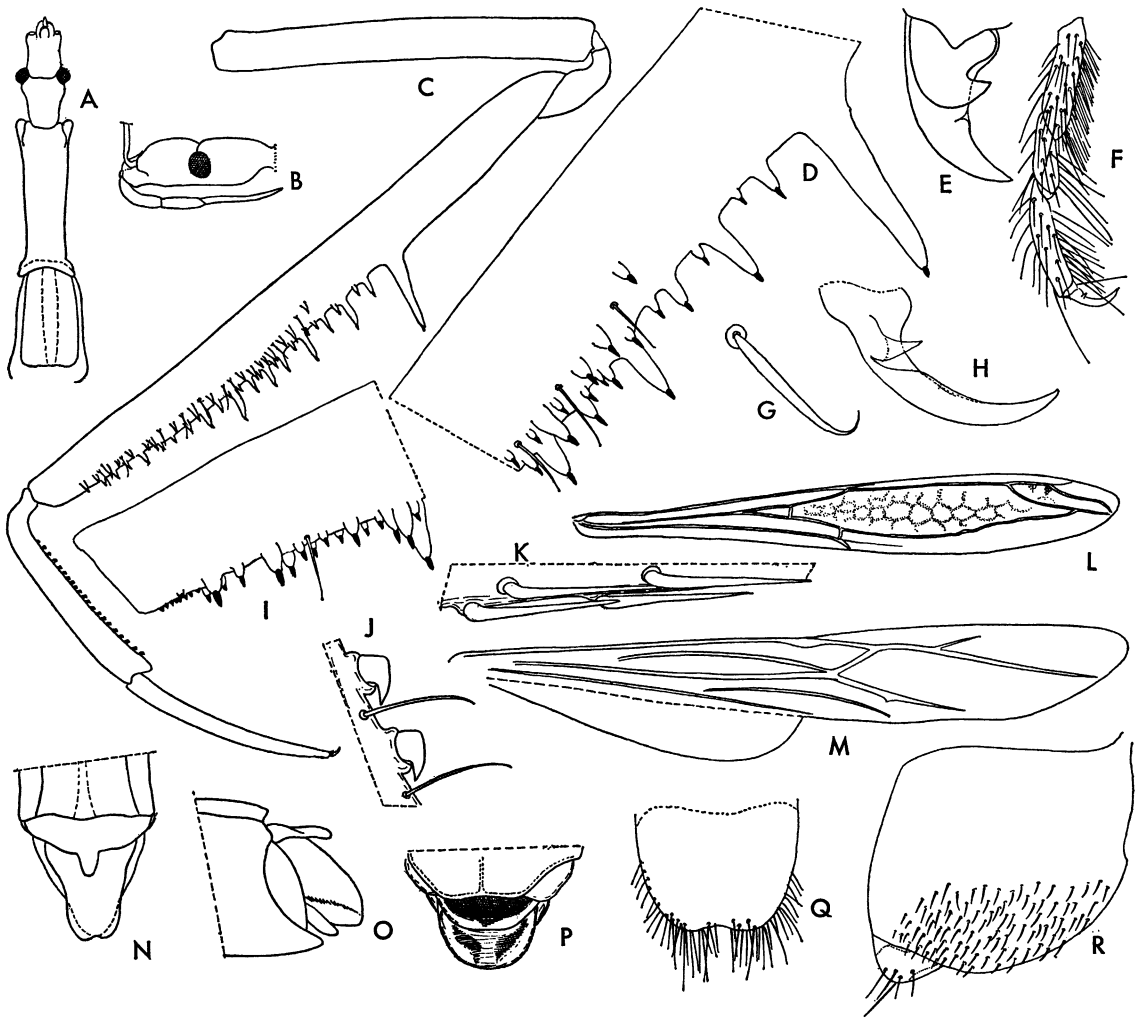


FIG. 145. *Ghilianella borgmeieri*, female. A. Head and thorax, dorsal view. B. Head, lateral aspect. C. Foreleg. D. Base of series of fore femur. E. Claws of foreleg. F. Tarsus of hind leg. G. Seta of posterior femur. H. Claw of hind leg. I. Apex of fore femur. J. Denticles of under surface of fore tibia. K. Spines of under surface of fore tarsus. L. Forewing. M. Hind wing. N. Genital region, posterodorsal view. O. Genital region, lateral aspect. P. Genital region, seen from below. Q. Syngonapophysis. R. Gonocoxite with gonapophysis.

meres of the male are like those of *mirabilis* (see fig. 147E, F). The structure of the posterior process of the pygophore and the lateral aspect of the phallus, as well as the external female genitalia, are illustrated in this paper.

MATERIAL EXAMINED: *Peru:* Tingo María, Río Huallaga, February 10, 1947, July 27, 1955, 700 meters (Weyrauch; the American Museum of Natural History), one male, one female; Valle del Río Cosnipata, 400 meters (F. Woytkowski; the American Museum of Natural History), one male; Pachitea (Hungarian National Museum), one male, one female. *Bolivia:* Rurrenabaque, July 14, 1957 (Kuschel; the American Museum of Natural History), one male.

DISTRIBUTION: Bolivia; Peru.

TYPE: Male, United States National Museum.

Ghilianella aracataca McAtee and Malloch

Ghilianella aracataca MCATEE AND MALLOCH, 1925, p. 112, figs. 182–184.

DISTRIBUTION: Colombia.
TYPE: Male, Academy of Natural Sciences of Philadelphia.

Ghilianella assanutrix Bergroth

Ghilianella assanutrix BERGROTH, 1906a, p. 314.

DISTRIBUTION: Venezuela; Surinam.
TYPE: Museum Zoologicum Universitatis.

Ghilianella atriclava Bergroth

Ghilianella atriclava BERGROTH, 1911, p. 19.

DISTRIBUTION: French Guiana.
TYPE: Male, Museum Zoologicum Universitatis.

Ghilianella bethei Dohrn

Ghilianella bethei DOHRN, 1863, p. 68.

DISTRIBUTION: Colombia; Costa Rica.
TYPE: Unknown.

Ghilianella borgmeieri, new species

Figure 145A–R

DESCRIPTION: Macropterous female: Length, 15–16.5 mm.; holotype: head, 1.8; thorax, 5.7; abdomen, 9 mm.

General color fulvous to fuscous. Head and thorax dorsally with poorly defined flavescent areas; ventral surface of head stramineous between eyes; rostrum ochraceous; antennae fuscous, first segment somewhat lighter toward base. Forelegs of general color, with not very distinct lighter areas, femora with two to three flavescent annuli on apical half, tibia with one submedian annulus, all light-colored; tarsus very dark. Mid and hind legs of general body color; femora with four not invariably well-defined, narrow, flavescent annuli; tibiae with three similar annuli on basal half; apex of tibia and entire tarsi very dark. Forewings light grayish brown, large discal cell faintly reticulate with dark (fig. 145L). Abdomen fuscous, dorsally and ventrally longitudinally striped with flavescent.

Head and rostrum as given in generic description and shown in figure 145A, B. Rostrum shining. Antennae slender, bare; length of first segment, 6.1 mm.; relative length of segments, 1/0.75/0.05/0.3.

Thorax as given in generic description and illustrated in figure 145A; mesonotum longitudinally impressed along middle.

Forelegs as given in generic description and shown in figure 145C–E, I–K. Basal process of posteroventral series of fore femur longer than diameter of article; small processes of posteroventral series situated mediad of medium-sized ones. Mid and hind legs as given in generic description; posterior femur surpassing apex of abdomen by 1 mm.; posterior tarsus and claws as shown in figure 145F, H.

Forewings as given in generic description and shown in figure 145L. Subbasal cell shorter or longer than distance between base of discal cell and insertion of Pcu on cell as measured along Cu. Hind wings as given in generic description and shown in figure 145M; length of apical free branch of R variable. Abdomen parallel-sided. Genitalia as given in generic description and shown in figure 145N–R. Seventh sternite salient at middle behind, truncate apically, covering most of gonocoxites laterally. Eighth tergite transverse, posteriorly with more or less prominent projection at center. Ninth tergite elongate, approximately tongue-shaped, somewhat emarginated at center behind, slightly depressed along posterolateral borders.

MATERIAL EXAMINED: *Brazil*: Guanabara: Campo Grande (Wygodzinsky; the American Museum of Natural History), one female holotype; Santa Catarina: Neu Bremen (F. Hoffman; Naturhistorisches Museum, Vienna), one female. *Argentina*: Formosa: Gran Guardia (J. Foerster; United States National Museum), one female.

Ghilianella brevicornis Haviland

Ghilianella brevicornis HAVILAND, 1931, p. 139, fig. 46g.

DISTRIBUTION: British Guiana.
TYPE: Male, British Museum (Natural History).

Ghilianella bulbifera Champion

Ghilianella bulbifera CHAMPION, 1898a, p. 171, pl. 10, figs. 17, 18.

DISTRIBUTION: Panama.
TYPE: British Museum (Natural History).

Ghilianella calva Maldonado

Ghilianella calva MALDONADO, 1960, p. 410, figs. 64, 77, 103, 121.

The data given by Maldonado (1960) indicate that this species was collected at Po-

sadas, Colombia, by Biraben. I have found no Posadas in Colombia, and Biraben never collected in that country. There is, however, a Posadas in the province of Misiones, Argentina, where Biraben did collect. The type locality must, therefore, be corrected.

DISTRIBUTION: Argentina (Misiones).

TYPE: Female, United States National Museum.

Ghilianella calymmata Maldonado

Ghilianella calymmata MALDONADO, 1960, p. 412, figs. 56, 94.

DISTRIBUTION: Colombia.

TYPE: Female, Chicago Natural History Museum.

Ghilianella clavellata Maldonado

Ghilianella clavellata MALDONADO, 1960, p. 418, figs. 50, 107, 124.

DISTRIBUTION: British Guiana.

TYPE: Female, the American Museum of Natural History.

Ghilianella colona McAtee and Malloch

Ghilianella colona MCATEE AND MALLOCH, 1925, p. 112.

MATERIAL EXAMINED: Colombia: Mamatoco, January, 1912 (Ujhelyi; Hungarian National Museum), one male.

DISTRIBUTION: Colombia; Honduras.

TYPE: Male, Carnegie Museum.

Ghilianella cuneata McAtee and Malloch

Ghilianella cuneata MCATEE AND MALLOCH, 1925, p. 113.

DISTRIBUTION: Panama.

TYPE: Female, United States National Museum.

Ghilianella fenestrata Maldonado

Ghilianella fenestrata MALDONADO, 1960, p. 420, figs. 25, 33, 82.

DISTRIBUTION: Costa Rica.

TYPE: Male, Naturhistorisches Museum Wien.

Ghilianella filiventris Spinola

Figure 146A–R

Ghilianella filiventris SPINOLA, 1850b, pp. 143, 144.

This is the type species; it has been redescribed by McAtee and Malloch (1925). The general aspect and structural details of the male are illustrated here in detail; a description is not deemed necessary.

MATERIAL EXAMINED: Brazil: Amazonas: Parú de Leste (J. C. M. Carvalho; Museu Nacional), one male; Pará: Taperinha, February 26, 1916 (Museu Nacional), one male.

DISTRIBUTION: Brazil (Pará; Amazonas); Peru.

TYPE: Unknown.

Ghilianella gibbiventris Champion

Ghilianella gibbiventris CHAMPION, 1898a, p. 172, pl. 10, fig. 20.

The male was redescribed and illustrated by Maldonado (1960).

DISTRIBUTION: Panama.

TYPE: British Museum (Natural History).

Ghilianella gladiator McAtee and Malloch

Ghilianella gladiator MCATEE AND MALLOCH, 1925, p. 115, figs. 188–190.

DISTRIBUTION: Trinidad.

TYPE: Male, Academy of Natural Sciences of Philadelphia.

Ghilianella globulata McAtee and Malloch

Ghilianella globulata MCATEE AND MALLOCH, 1925, p. 118, fig. 193.

Ghilianella ignorata CHAMPION, 1898a, p. 170 (*nec* Dohrn).

DISTRIBUTION: Guatemala; Honduras; Peru.

TYPE: Male, United States National Museum.

Ghilianella grapta Maldonado

Ghilianella grapta MALDONADO, 1960, p. 425, figs. 17, 34, 63, 101, 102, 141.

MATERIAL EXAMINED: Venezuela: Merida (Briceño; Hungarian National Museum), two males.

DISTRIBUTION: Venezuela.

TYPE: Male, the American Museum of Natural History.

Ghilianella ica McAtee and Malloch

Ghilianella ica MCATEE AND MALLOCH, 1925, p. 111.

DISTRIBUTION: Brazil (Amazonas).

TYPE: Male, Muséum National d'Histoire Naturelle.

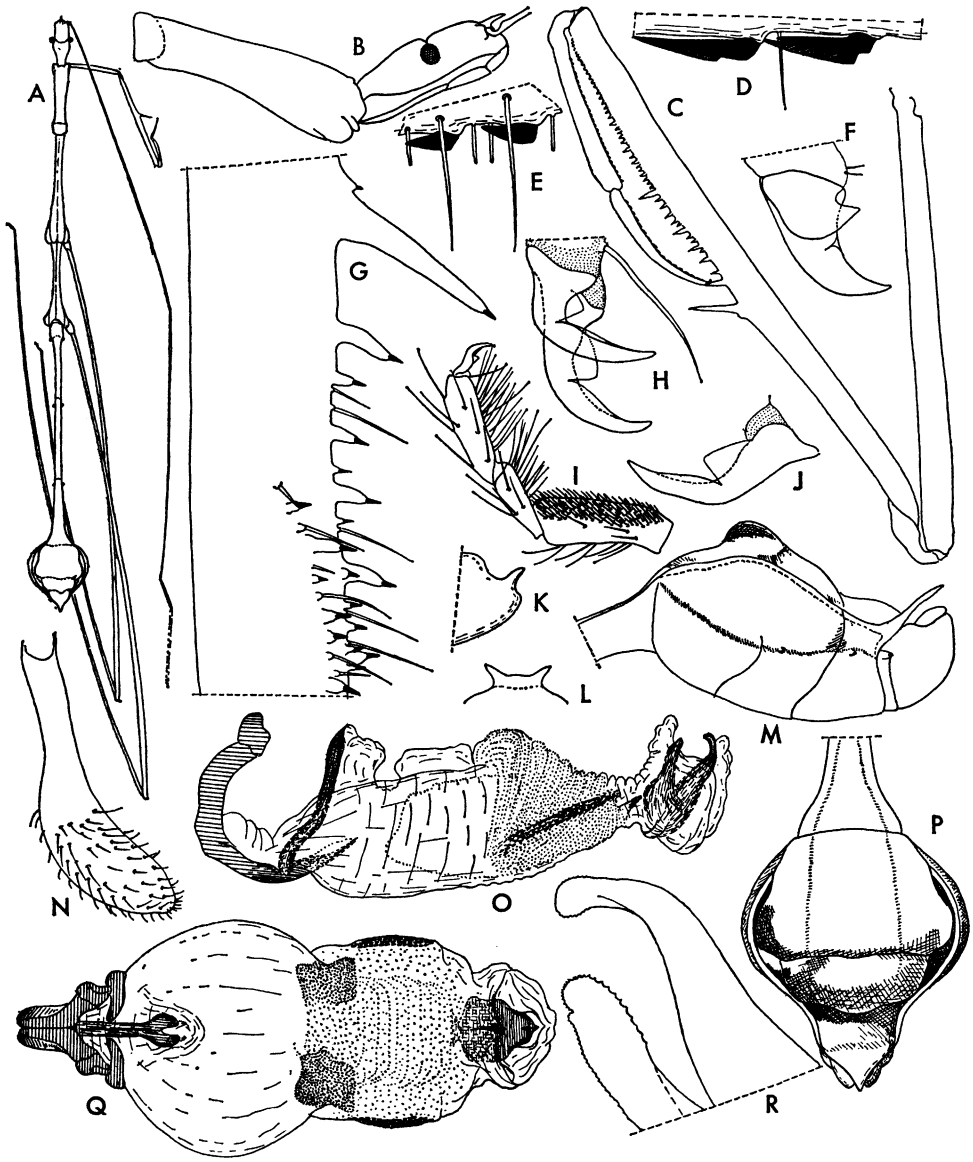


FIG. 146. *Ghilianella filiventris*, male. A. General aspect. B. Head and prothorax, lateral view. C. Foreleg. D. Spines of under surface of fore tarsus. E. Detail of under surface of fore tibia. F. Claws of foreleg. G. Base of series of fore femur. H. Praetarsus and claws of hind leg. I. Posterior tarsus. J. Claw of hind leg, different aspect. K. Apex of pygophore, lateral view. L. Apex of pygophore, seen from behind. M. Posterior portion of abdomen, lateral view. N. Paramere. O. Phallus, lateral view. P. Posterior portion of abdomen, seen from above. Q. Phallus, dorsal view. R. Apex of sclerotized projections of endosoma, lateral view, high magnification.

Ghilianella ignorata Dohrn

Ghilianella ignorata DOHRN, 1860, p. 238, figs. 9, 11.

An illustrated redescription of this species was given by Wygodzinsky (1951a).

DISTRIBUTION: Venezuela; Panama.

TYPE: Male, Naturhistorisches Museum, Vienna.

Ghilianella megharpacta Maldonado

Ghilianella megharpacta MALDONADO, 1960, p. 430, figs. 4, 31.

DISTRIBUTION: Peru.
TYPE: Male, United States National Museum.

Ghilianella mirabilis McAtee and Malloch

Figure 147A–J, M

Ghilianella mirabilis MCATEE AND MALLOCH, 1925, p. 125, figs. 205–209.

The claws of the forelegs are like those of *filiventris*. The tarsus and claws of the hind legs are shown in figure 147B. The setae of the abdominal sternites are very long and slender (fig. 147C). The posterior process of the pygophore, the shape of the genital segments, the parameres, and the structure of the phallus are also illustrated.

MATERIAL EXAMINED: *Bolivia:* Beni: Guayaramerin, July, 1956 (Fritz; the American Museum of Natural History), one female. *Brazil:* Amazonas: Manaus, Yguapé do Francés, November 28, 1955 (Elias and Rappa, the American Museum of Natural History), one male; Manaus, Yguapé do Passarinho, September 21, 1955 (Elias and Rappa; Museu Nacional), one female; Manaus, Estrada BR. 17, kilometer 30, October 26, 1955 (Elias and Rappa, the American Museum of Natural History), one female; Manaus: Estrada BR. 17, kilometer 19, December 14, 1955 (Elias and Rappa; Museu Nacional), one female.

DISTRIBUTION: Bolivia; Brazil (Amazonas).
TYPE: Male, Naturhistoriska Riksmuseet.

Ghilianella obesa Maldonado

Ghilianella obesa MALDONADO, 1960, p. 433, figs. 67, 81, 93, 126.

DISTRIBUTION: Costa Rica.
TYPE: Female, Museum of Comparative Zoölogy.

Ghilianella pachitea McAtee and Malloch

Ghilianella pachitea MCATEE AND MALLOCH, 1925, p. 111, fig. 181.

MATERIAL EXAMINED: Peru: Pachitea (Hungarian National Museum), two males.
DISTRIBUTION: Peru; Brazil (Amazonas).
TYPE: Male, the University of Kansas.

Ghilianella panamana Maldonado

Ghilianella panamana MALDONADO, 1960, p. 434, figs. 52, 92, 120.

DISTRIBUTION: Panama.
TYPE: Female, Museum of Comparative Zoölogy.

Ghilianella patruela McAtee and Malloch

Ghilianella patruela MCATEE AND MALLOCH, 1925, p. 119, fig. 194.

DISTRIBUTION: Costa Rica; Nicaragua.
TYPE: Male, United States National Museum.

Ghilianella pendula McAtee and Malloch

Ghilianella pendula MCATEE AND MALLOCH, 1925, p. 116.
Ghilianella bulbifera CHAMPION, 1898a, p. 171, fig. 18 [females].

MATERIAL EXAMINED: Panama: La Chorrera, December 20, 1944 (the California Academy of Sciences), one female; Canal Zone: Gatun, Tres Ríos Plantation, February 27, 1930 (the California Academy of Sciences), one female.
DISTRIBUTION: Panama.
TYPE: Female, United States National Museum.

Ghilianella perigynium McAtee and Malloch

Ghilianella perigynium MCATEE AND MALLOCH, 1925, p. 120, fig. 197.

DISTRIBUTION: Peru.
TYPE: Male, the University of Kansas.

Ghilianella peruviana McAtee and Malloch

Ghilianella peruviana MCATEE AND MALLOCH, 1925, p. 125.

DISTRIBUTION: Peru.
TYPE: Female, Cornell University.

Ghilianella perversa McAtee and Malloch

Ghilianella perversa MCATEE AND MALLOCH, 1925, p. 110, figs. 178, 179.

DISTRIBUTION: Colombia.
TYPE: Female, Academy of Natural Sciences of Philadelphia.

Ghilianella puncticauda Maldonado

Ghilianella puncticauda MALDONADO, 1953, p. 189, figs. 1–8.

DISTRIBUTION: Venezuela.
TYPE: Male, United States National Museum.

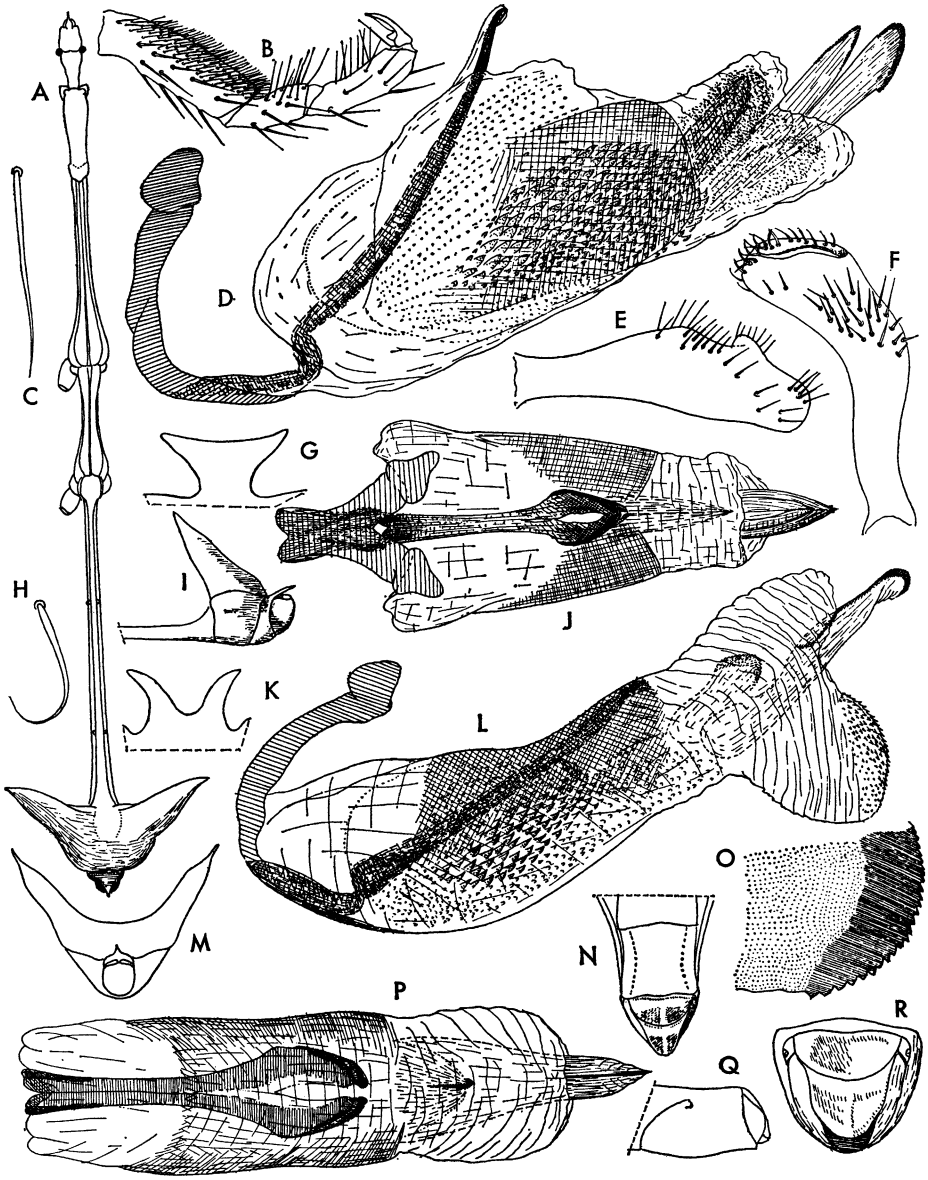


FIG. 147. A–J. *Ghilianella mirabilis*, male. A. General aspect. B. Posterior tarsus. C. Seta of eighth sternite. D. Phallus, lateral view. E, F. Paramere, different aspects. G. Process of pygophore, seen from behind. H. Seta of posterior femur. I. Apex of abdomen, lateral aspect. J. Phallus, dorsal view. K, L. *Ghilianella approximata*, male. K. Process of pygophore, seen from behind. L. Phallus, lateral view. M. *Ghilianella mirabilis*, male, genital region, seen from behind. N–R. *Ghilianella approximata*. N. Genital segments of female, dorsal view. O. Apex of distal projection of endosoma process, high magnification. P. Phallus, dorsal view. Q. Apex of abdomen of female, lateral view. R. Genital segments of female, seen from behind.

Ghilianella recondita McAtee and Malloch

Ghilianella recondita McAtee and Malloch, 1925, p. 119, figs. 195, 196.

Distribution: Colombia; Venezuela.

Type: Male, Academy of Natural Sciences of Philadelphia.

Ghilianella signata McAtee and Malloch

Ghilianella signata McAtee and Malloch, 1925, p. 120, fig. 198.

The original description refers to the female only. Maldonado (1960) described and illustrated the male.

Material Examined: Colombia: Sierra San Lorenzo (Uhjelyi; Hungarian National Museum), one male.

Distribution: Colombia.

Type: Female, Academy of Natural Sciences of Philadelphia.

Ghilianella similata McAtee and Malloch

Ghilianella similata McAtee and Malloch, 1925, p. 116, fig. 192.

Distribution: Venezuela.

Type: Female, Universitetets Zoologiska Museum.

Ghilianella spinata Maldonado

Plate 3, figure 6

Ghilianella spinata Maldonado, 1960, p. 438, figs. 28, 47, 69, 80, 84, 85.

Material Examined: Jamaica: Great Morass, March 25, 1955 (A. M. Nadler; the American Museum of Natural History), one female.

Distribution: Jamaica.

Type: Male, Department of Entomology, University of Michigan.

Ghilianella spinicaudata Maldonado

Ghilianella spinicaudata Maldonado, 1960, p. 440, figs. 70, 76, 78, 89, 114.

The male was described by Maldonado (1960); the female, by Maldonado and Farr (1962).

Distribution: Jamaica.

Type: Female, Institute of Jamaica.

Ghilianella stipitata McAtee and Malloch

Ghilianella stipitata McAtee and Malloch, 1925, p. 116, fig. 191.

Distribution: Venezuela.

Type: Female, Muséum National d'Histoire Naturelle.

Ghilianella strigata McAtee and Malloch

Ghilianella strigata McAtee and Malloch, 1925, p. 121, fig. 199.

Distribution: Costa Rica.

Type: Male, United States National Museum.

Ghilianella subglobulata McAtee and Malloch

Ghilianella subglobulata McAtee and Malloch, 1925, p. 121.

Distribution: Venezuela.

Type: Male, Muséum National d'Histoire Naturelle.

Ghilianella sulcata Maldonado

Ghilianella sulcata Maldonado, 1953, p. 194, figs. 14, 15.

Distribution: Venezuela.

Type: Male, United States National Museum.

Ghilianella truncata McAtee and Malloch

Ghilianella truncata McAtee and Malloch, 1925, p. 126, figs. 213, 214.

Emesa angulata Uhler, 1893, p. 717 (part).

Distribution: Panama.

Type: Holotype female, United States National Museum.

Ghilianella uncinata McAtee and Malloch

Figures 12H; 148A–D

Ghilianella uncinata McAtee and Malloch, 1925, p. 122, fig. 200.

The hind tarsus and claw and the phallus are figured here.

Distribution: Panama.

Type: Male, United States National Museum.

2. GHILIANELLA (PLOEODONYX) McAtee and Malloch

Ghilianella (*Ploeodonyx*) McAtee and Malloch, 1925, p. 99.

Ghilianella (*Lissonyx*) McAtee and Malloch, 1925, p. 99 (new synonymy).

Ghilianella amicula McAtee and Malloch

Ghilianella (*Ploeodonyx*) *amicula* McAtee and Malloch, 1925, p. 127.

Distribution: French Guiana.

Type: Female, Muséum National d'Histoire Naturelle.

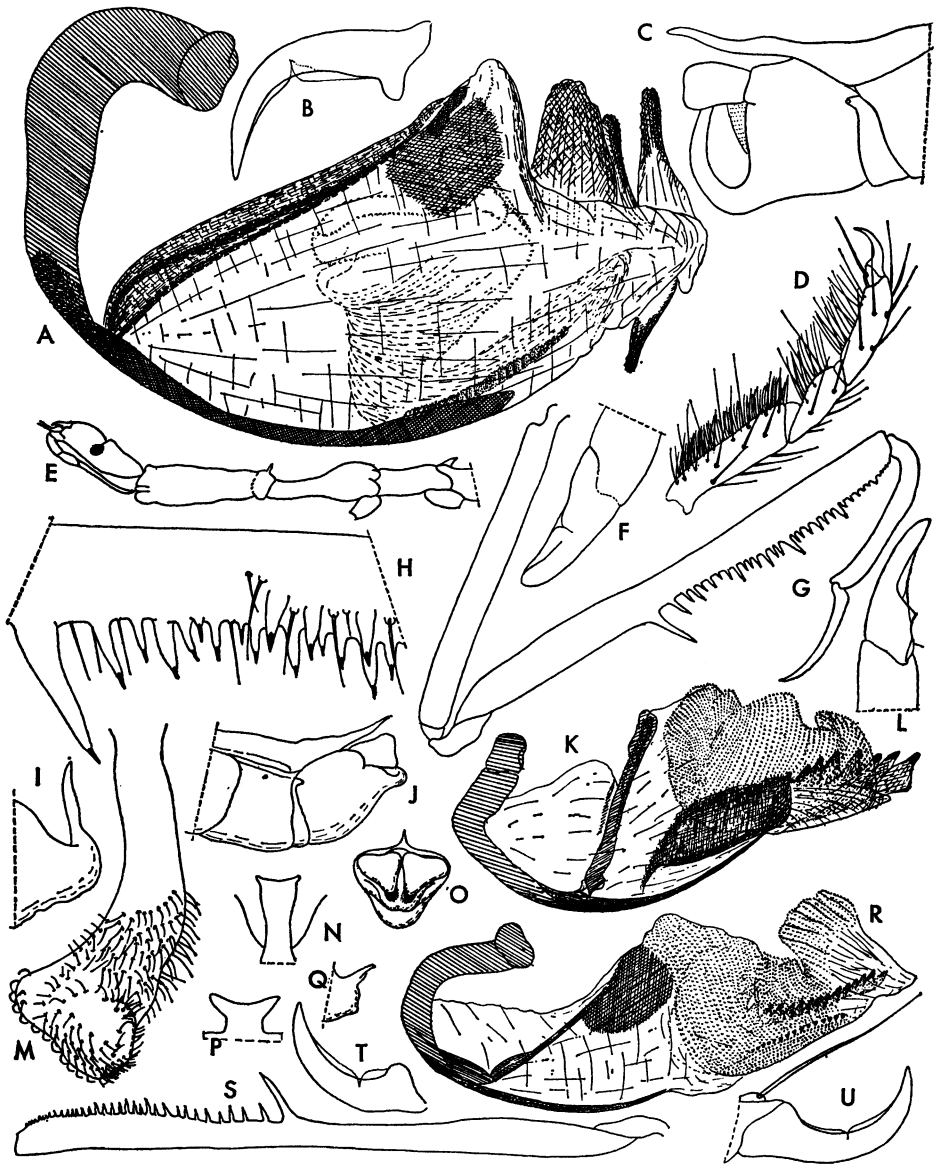


FIG. 148. A–D. *Ghilianella uncinata*, male. A. Phallus, lateral view. B. Claw of hind leg. C. Genital region, lateral view. D. Posterior tarsus. E–K. *Ghilianella angulata*, male. E. Head and thorax, lateral view. F. Apex of fore tarsus with claw. G. Foreleg. H. Base of series of fore femur. I. Apex of pygophore with process, lateral view. J. Apex of abdomen, lateral aspect. K. Phallus, lateral view. L. *Ghilianella insidiatrix*, apex of fore tarsus, with claw. M–O. *Ghilianella angulata*, male. M. Paramere. N. Process of pygophore, seen from behind. O. Pygophore, posterior view. P–U. *Ghilianella insidiatrix*, male. P. Process of pygophore, seen from behind. Q. Apex of pygophore, with process, lateral aspect. R. Phallus, lateral view. S. Fore femur. T–U. Claws of hind leg.

Ghilianella angulata (Uhler)

Figure 148E–K, M–O

Emesa angulata UHLER, 1893, p. 717.
Ghilianella angulata: CHAMPION, 1898a, p. 172.
Ghilianella (Lissonyx) angulata: MCATEE AND MALLOCH, 1925, p. 128, fig. 217.

I have examined the male seen by McAtee and Malloch (1925). Some of its structures are here illustrated.

DISTRIBUTION: West Indies (Saint Vincent; Grenada).

TYPE: British Museum (Natural History).

Ghilianella glabrata McAtee and Malloch

Ghilianella (Ploeodonyx) glabrata MCATEE AND MALLOCH, 1925, p. 128.

DISTRIBUTION: British Guiana.

TYPE: Female, United States National Museum.

Ghilianella insidiatrix Bergroth

Figures 148L, P–U

Ghilianella insidiatrix BERGROTH, 1922a, p. 219.
Ghilianella (Ploeodonyx) insidiatrix: MCATEE AND MALLOCH, 1925, p. 126, figs. 215, 216.

Some structural details of the legs and pygophore and the phallus are illustrated here.

DISTRIBUTION: French Guiana; Surinam; upper Amazon.

TYPE: Male, Museum Zoologicum Universitatis.

SPECIES INCERTAE SEDIS

Many species originally described under *Ghilianella* are being transferred to other genera, mainly *Ghinallelia*, in the present paper, or were formerly removed from the genus by various authors. They can be found through the Index at the end of this work. Other species originally described in *Ghilianella*, some unidentifiable, belong either in *Ghilianella* or *Ghinallelia* and are enumerated here.

Ghilianella analis (Dohrn)

Emesa analis DOHRN, 1860, p. 229, figs. 5, 14.
Ghilianella analis: STÅL, 1862, p. 504.

DISTRIBUTION: Surinam.

TYPE: Unknown.

Ghilianella andersoni Haviland

Ghilianella andersoni HAVILAND, 1931, p. 139, fig. 46h.

The author of this species compared it to *pascoei*, a species here included in *Ghinallelia*. Maldonado (1960) keyed it out with *angulata*, listed here under *Ghilianella (Ploeodonyx)*.

DISTRIBUTION: British Guiana.

TYPE: Male, British Museum (Natural History).

Ghilianella annulata (Dohrn)

Emesa annulata DOHRN, 1863, p. 65.
Ghilianella annulata: BERGROTH, 1906a, p. 317.

McAtee and Malloch (1925) believed that this species was the same as their *aracataca*, which would place it definitely in *Ghilianella*.

DISTRIBUTION: South America.

TYPE: Unknown.

Ghilianella gerstaeckeri (Dohrn)

Emesa gerstaeckeri DOHRN, 1860, p. 223.
Ghilianella gerstaeckeri: STÅL, 1862, p. 504.

DISTRIBUTION: Haiti.

TYPE: Unknown.

Ghilianella gibberosa Piza

Ghilianella gibberosa PIZA, 1939, p. 619, figs. 1, 4, 5.

This species may belong in *Ghinallelia*.

DISTRIBUTION: Brazil (Amazonas).

TYPE: Male, collection Piza.

Ghilianella granulata Champion

Ghilianella granulata CHAMPION, 1898a, p. 171, pl. 10, fig. 1g.

DISTRIBUTION: British Honduras.

TYPE: British Museum (Natural History).

Ghilianella horsti (Kirkaldy)

Hippokleides horsti KIRKALDY, 1901, p. 55.
Ghilianella horsti: BERGROTH, 1906a, p. 320.

This species, though placed in *Ghilianella* by Bergroth as early as 1906, was not recorded by McAtee and Malloch (1925) and Maldonado (1960). As mentioned by Bergroth, the species is unidentifiable from the description.

DISTRIBUTION: Unknown (introduced in the Netherlands).

TYPE: Rijksmuseum van natuurlijke Historie.

Ghilianella imbecilla (Dohrn)

Emesa imbecilla DOHRN, 1860, p. 228.
Ghilianella imbecilla STÅL, 1862, p. 504.

DISTRIBUTION: Brazil (Pará).
TYPE: Unknown.

Ghilianella neivai Piza

Ghilianella neivai PIZA, 1939, p. 620, figs. 2, 3, 6–8.

To judge from the description, this species may be a *Ghinallelia*. Maldonado (1960) erroneously figured the seventh sternite of the female of *neivai* as that of the male of *gibberosa*.

DISTRIBUTION: Brazil (Santa Catarina).
TYPE: Collection Piza.

Ghilianella servillei (Spinola)

Emesa servillei SPINOLA, 1840, p. 90.
Ghilianella servillei: LETHIERRY AND SEVERIN, 1896, p. 72.

DISTRIBUTION: Brazil.
TYPE: Unknown.

Ghilianella spinolae Dohrn

Ghilianella spinolae DOHRN, 1860, p. 238.

DISTRIBUTION: Brazil (Amazon).
TYPE: Unknown.

Ghilianella tenera Dohrn

Ghilianella tenera DOHRN, 1863, p. 70.

This species has not been mentioned by the revisers of the genus.

DISTRIBUTION: Country unknown.
TYPE: Unknown.

GHINALLELIA, NEW GENUS

Ghilianella AUCT. (part).

DESCRIPTION: Apterous. Medium-sized to very large species (10–33 mm.).

General characters like those of apterous morph of *Ghilianella* (see above). Modified setae mostly pointed, very rarely rounded apically (*productilis*).

Mesonotum in most cases not or only very slightly longer than pronotum, only rarely distinctly longer than pronotum (*globifera, claviventris*).

Femur of forelegs generally slender, unspined portion relatively extended; only very rarely (*galapagensis*) unspined portion shorter than length of first basal process; femur slightly widening from base toward first process. Posteroventral series of fore femur like that of *Ghilianella;* anteroventral series consisting of hairs or setae which may or may not arise from short, wartlike bases and usually a single large spine at apex of series. Rest of forelegs and mid and hind legs like those of *Ghilianella*.

Shape of abdomen varying, in most cases outline of dorsum forming continuous, straight or softly curved line, occasionally racket-shaped (*galapagensis, mariae*) or very rarely (*globifera*) with a subterminal bulbosity.

Male: Seventh tergite, eighth sternite, and pygophore like those of *Ghilianella;* posterior process of pygophore generally but not invariably pointed apically. Parameres varying in structure. Phallus with phallosoma in some cases slightly asymmetrical, endosoma invariably conspicuously so. Basal plate struts directed toward dorsal wall of phallobase, fused, separated only apically, their shape irregular, especially toward distal region. Dorsal sclerotization of phallobase invariably developed, though in some reduced in extension, in many of irregular outline; ventral sclerotization of phallobase absent or present, in latter case forming two parallel bands. Endosoma irregularly shaped, its walls striate and beset with numerous regularly arranged spiculae; endosoma processes numerous, their shape various, their texture from membranous to heavily sclerotized, often denticulate or serrate apically.

Female genitalia like those of *Ghilianella*.

TYPE SPECIES: *Ghilianella globifera* Bergroth.

ETYMOLOGY: Anagram of *Ghilianella*, a genus of the Emesinae.

DISTRIBUTION: Neotropical Region.

OBSERVATIONS: As shown under *Ghilianella*, the species belonging to the genus here described have formerly been included in *Ghilianella*. The apomorphic combination of the simplified structure of the anteroventral series of the fore femur and the highly modified asymmetrical phallus is deemed sufficient for the creation of a new genus to include the species that share these characters.

It would seem that the morphological specialization of *Ghinallelia* is correlated with wider ecological tolerances as compared with

those of *Ghilianella*. Species of the latter genus, with the possible exception of the single winged form, are apparently restricted to the rain forests of the American tropics, but *Ghinallelia*, which ranges from the southern United States over the West Indies into South America as far south as northern Argentina, has species in mesophytic forests as well as in grassland and desert regions. It is interesting to note that *Ghinallelia* is not found in Central America.

KEY TO THE SPECIES OF *GHINALLELIA*

1. Males 2
   Females 22
2. Mesonotum distinctly longer than pronotum (fig. 150A) 3
   Mesonotum little if any longer than pronotum (figs. 149E; 151A) 5
3. Abdomen with a bulbous swelling beyond middle (fig. 150A) 4
   Abdomen lacking said swelling, parallel-sided . . . . . *borincana*
4. Widest part of abdominal bulbosity in fourth segment (fig. 150A) . . . . . *globifera*
   Widest part of abdominal bulbosity in fifth segment . . . . . *claviventris*
5. Abdomen almost racket-shaped (as shown in fig. 151A) . . . . . *mariae*
   Abdomen parallel-sided; or, if some segment wider, then very slightly so 6
6. Apex of upper margin of pygophore with long, tapering process, mostly hidden by broad rectangular parameres; pygophore almost at right angle to rest of abdomen (fig. 149D) . . . . . *campulligaster*
   Pygophore different, in line with rest of abdomen or only slightly bent upward (fig. 149K) 7
7. Posterolateral angles of connexival segments produced 8
   Posterolateral angles of connexival segments not produced (fig. 149E) 9
8. Head and thorax densely granulate; posterior border of sixth abdominal tergite with backwardly sloping tubercle at center . . . . . *haitiana*
   Head and thorax not granulated; sixth tergite lacking such tubercle . . . . . *lissa*
9. Head and thorax copiously granulate; hind margin of sixth sternite almost straight; seventh tergite triangular apically, not keeled, extending little if any beyond pygophore; upper margin of pygophore convex . . . . . *pascoei*
   Hind margin of sixth sternite with a broad, central, rounded concavity and smaller lateral ones, sternum longest at a point between lateral margin and median line; or with different set of characters 10
10. Constricted portion of seventh tergite distinctly longer than apical expanded part . . . . . *persimilis*
    Constricted portion of seventh tergite, if developed at all, distinctly shorter than terminal expanded part 11
11. Head and thorax conspicuously granulate 12
    Head and thorax not granulate, or very sparsely so 14
12. Short species (14–17 mm. long) 13
    Species more than 23 mm. long . . *signoreti*
13. Length, 15–17 mm.; head with a pair of divergent pointed tubercles just behind interocular furrow; eighth sternite very short, nearly hidden by seventh . . . . . *minimula*
    Length, 14 mm.; head without such tubercles; eighth sternite long, nearly half as long as seventh . . . . . *rhabdita*
14. Eighth sternite with sides more or less concealed . . . . . *maculata*
    Eighth sternite visible on its whole length, spiracles moderately pedunculate (fig. 149K) 15
15. Parameres very broadly triangular, their width at apex equaling their length . . . . . *personata*
    Parameres elongate, variously shaped but in no case triangular 16
16. Apical process of pygophore short, exposed, vertical and with an apical U-shaped notch in posterior view (fig. 151M) . . *varicornis*
    Apical process of pygophore bent cephalad and hidden by parameres, or not shaped as above 17
17. Parameres wide subbasally, much narrowed apically 18
    Parameres of nearly same width throughout their length, rectangular or trapezoidal in lateral view (fig. 149K) 19
18. Length, 25 mm.; last tergite with shallow, lateral constriction . . . . . *simillima*
    Length, 29 mm.; last tergite lacking constriction . . . . . *longula*
19. Length, 18 mm.; color testaceous; last tergite surpassing pygophore by length of paramere . . . . . *bicaudata*
    Length, more than 20 mm.; color castaneous or black; last tergite surpassing pygophore only slightly if at all (fig. 149K) 20
20. Color castaneous, mottled with fuscous; process of pygophore of male very narrow, about five times as long as wide (fig. 149J) . . . . . *productilis*

Abdomen dark, banded transversely with light-colored pubescence; process of pygophore stouter, less than five times as long as wide 21

21. Transverse banding of abdomen silvery, situated on basal portion of segments; process of pygophore of male as long as its maximum width, its sides convex . . *monensis*

Transverse banding of abdomen golden, situated on apical portion of segments; process of pygophore of male longer than its maximum width, its sides concave . . . *zomata*

22. Mesonotum longer than pronotum (fig. 150A) 23

Mesonotum not longer than pronotum (figs. 149E; 150U) 24

23. Abdomen distinctly widened on posterior half (fig. 150B) . . . . . *globifera*

Abdomen parallel-sided . . . . . *atabapo*

24. Posterolateral angles of at least four connexival segments more or less ampliate and produced; outline of abdomen in dorsal aspect not a continuous straight or curved line . . . . . *haitiana*

Posterior angles of connexival segments, except in some cases for those of fifth, sixth, or seventh, not produced; outline of abdomen in dorsal view a continuous straight (fig. 150H) or curved line 25

25. Basal spine of fore femur situated less than its own length from base of femur; fore tibia and tarsus combined three-fourths as long as femur; interantennal spine a mere wart; abdomen racket-shaped. . . *galapagensis*

Basal spine of fore femur slightly or distinctly more than its own length from base of femur (fig. 151D); combination of other characters not as above. 26

26. Seventh sternite slightly or distinctly produced at middle behind (figs. 150S, T) 27

Seventh sternite not produced at center behind. 37

27. Hind border of seventh tergite not tuberculate 28

Hind margin of seventh tergite more or less tuberculate (fig. 150R) 30

28. Hind border of seventh tergite emarginated at center; seventh sternite roundly produced at center . . . . . *personata*

Hind border of seventh tergite not emarginate at center 29

29. Head and thorax copiously granulate; seventh tergite triangularly produced at hind margin; eighth tergite short and broad . . . . . *alterata*

Head and thorax sparsely granulate; hind margin of seventh tergite straight; eighth tergite semicircular . . . . . *semipallida*

30. Median tubercle on hind margin of seventh tergite extending farther posteriorly than lateral angles; ninth tergite apically with three closely approximated, finger-like ridges . . . . . *persimilis*

Different combination of characters . . .31

31. Apex of ninth tergite distinctly curved upward 32

Apex of ninth tergite not curved upward (fig. 150 O, P) 33

32. Apex of ninth tergite emarginate at center; projection of seventh sternite rectangular, longer than wide at base . . . . *monensis*

Apex of ninth tergite straight; projection of seventh sternite rounded . . . *productilis*

33. Apex of ninth tergite decurved 34

Apex of ninth tergite not decurved . . .35

34. Apex of ninth tergite distinctly decurved, longitudinally strigate and with strong median carina, lateral margins depressed . . . . . *succincta*

Apex of ninth tergum slightly decurved, lateral margins strongly elevated, depressed median area with carina extending from upper, transverse, corrugated third of tergum . . . . . *aliena*

35. Ninth tergite with 1+1 strong, posterolateral, finger-like elevations or projections (fig. 150P) . . . . . *signoreti*

Ninth tergite without such projections . .36

36. Size, 13 mm.; ninth tergite broadly truncate apically, its median longitudinal carina one-third as wide as entire tergite . . . *nanna*

Size, 19 mm.; ninth tergite narrowly rounded apically, its median carina much narrower than one-third of width of tergite (fig. 150 O) . . . . . *brasiliensis*

37. Eighth tergite visible only as two small, rounded, laterally situated protuberances below apex of seventh tergite, not continued downward in center over base of ninth tergite . . . . . *alveola*

Eighth tergite normally developed, covering base of ninth 38

38. Sixth tergite with a prominent protuberance; seventh with smaller median one at center of hind margin . . . . . *varicornis*

Sixth tergite lacking prominent protuberance 39

39. Apex of ninth tergite with strong bidentate tubercle on each side . . . . .*bicaudata*

Ninth tergite different 40

40. Abdomen almost racket-shaped (fig. 151A); posterolateral angles of fifth connexival segment laterally produced; size, 11.5 mm. . . . . *mariae*

Abdomen parallel-sided; angles of fifth connexival segment not produced 41
41. Sixth sternite one-third longer on sides than at middle . . . . . *pascoei*
Sixth sternite less deeply emarginate posteriorly 42
42. Length, more than 30 mm.; apex of ninth tergite overlain with two strong, finger-like processes . . . . . *longula*
Length, less than 20 mm.; apex of ninth tergite with low, median carina . . . . . *minimula*

Ghinallelia aliena (McAtee and Malloch), new combination

Ghilianella aliena McAtee and Malloch, 1925, p. 106.

Distribution: Venezuela.
Type: Female, Muséum National d'Histoire Naturelle.

Ghinallelia alterata (McAtee and Malloch), new combination

Ghilianella alterata McAtee and Malloch, 1925, p. 107.

Distribution: Venezuela.
Type: Female, Muséum National d'Histoire Naturelle.

Ghinallelia alveola (McAtee and Malloch), new combination

Ghilianella alveola McAtee and Malloch, 1925, p. 104, p. 174.

Distribution: West Indies (Grenada).
Type: Female, United States National Museum.

Ghinallelia atabapo (Maldonado), new combination

Ghilianella atabapo Maldonado, 1953, p. 190, figs. 9, 10.

Distribution: Colombia.
Type: Female, United States National Museum.

Ghinallelia bicaudata (McAtee and Malloch), new combination

Ghilianella bicaudata McAtee and Malloch, 1925, p. 101, fig. 169.

The original description was based on the female. Maldonado (1960) described and illustrated the male.

Distribution: Cuba.
Type: Female, United States National Museum.

Ghinallelia borincana (Maldonado), new combination

Ghilianella borincana Maldonado, 1960, p. 406, figs. 23, 36, 72, 108.
Ghilianella longula Barber, 1939, p. 388 (*nec* McAtee and Malloch, 1925).

Distribution: Puerto Rico.
Type: Male, United States National Museum.

Ghinallelia brasiliensis (Dohrn), new combination

Figure 150 O, S, U

Emesa brasiliensis Dohrn, 1860, p. 227.
Ghilianella brasiliensis: Lethierry and Severin, 1896, p. 72.

This species, not examined by McAtee and Malloch, was redescribed by Wygodzinsky (1951a) from the type. Some of its characters are illustrated here again.

Distribution: Brazil.
Type: Female, Naturhistorisches Museum, Vienna.

Ghinallelia campulligaster (Maldonado), new combination

Figure 149A–D

Ghilianella campulligaster Maldonado, 1960, p. 414, figs. 13, 14, 40.

Some details of the male genitalia are illustrated here. The parameres possess the subapical pointed process typical for the group of species around *minimula*, described below. The posterior process of the pygophore is long and pointed.

Distribution: Brazil (Espirito Santo).
Type: Male, United States National Museum.

Ghinallelia claviventris (Bergroth), new combination

Ghilianella claviventris Bergroth, 1906a, p. 318.

Distribution: Venezuela.
Type: Male, Museum Zoologicum Universitatis.

Ghinallelia galapagensis (Heidemann), new combination

Ghilianella galapagensis Heidemann, 1901, p. 367.

The first illustrations of *galapagensis* were given by McAtee and Malloch (1925). It would be interesting to examine the male of

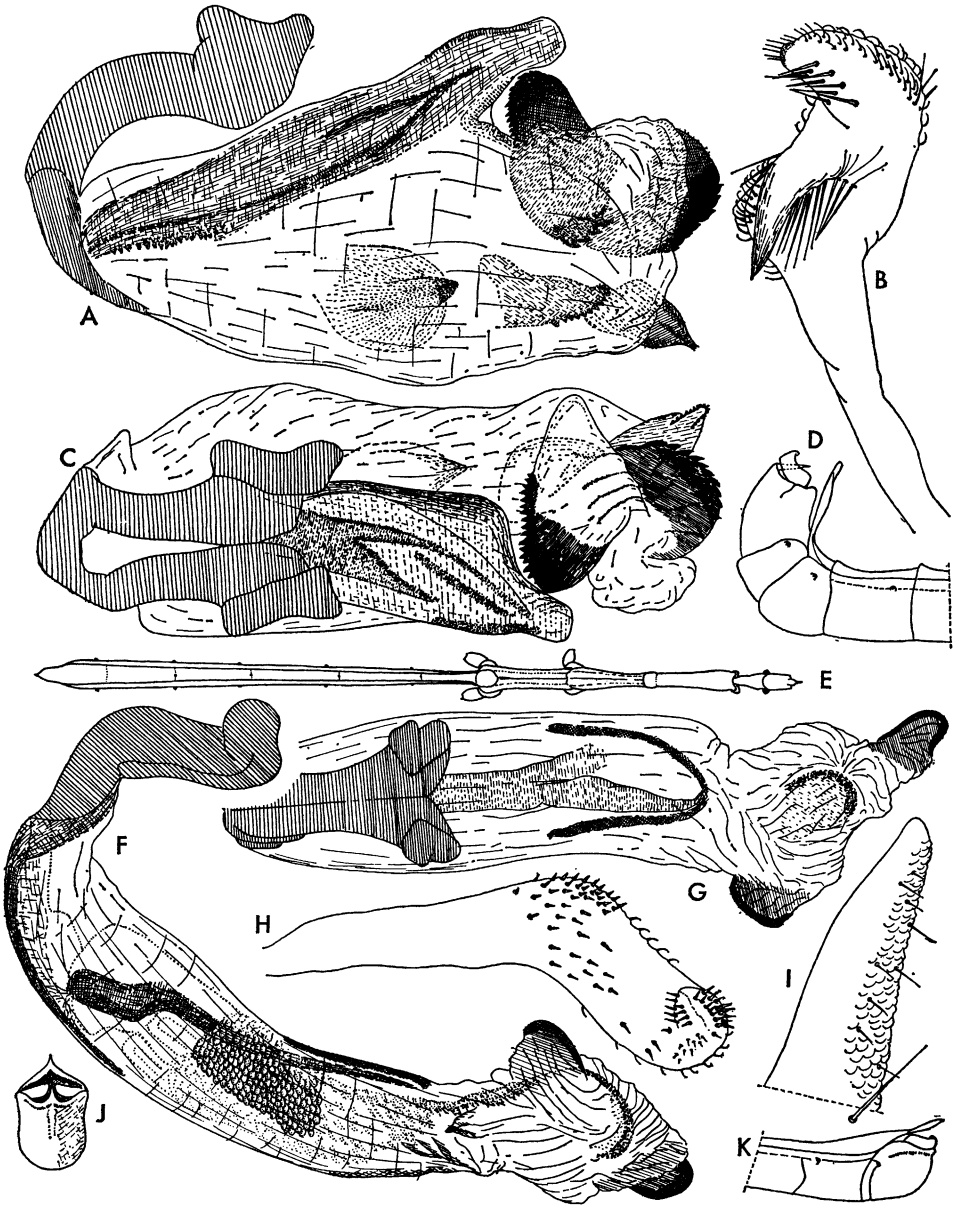


FIG. 149. A–D. *Ghinallelia campulligaster*, male. A. Phallus, lateral view. B. Paramere. C. Phallus, dorsal aspect. D. Apex of abdomen, lateral aspect. E–K. *Ghinallelia productilis*, male. E. General aspect. F. Phallus, lateral view. G. Phallus, dorsal aspect. H. Paramere. I. Apex of process of pygophore, lateral view, high magnification. J. Pygophore, seen from behind. K. Apex of abdomen, lateral aspect.

this somewhat aberrant species in order to re-evaluate its systematic position. Only the female is known.

DISTRIBUTION: Galapagos Islands.

TYPE: Female, United States National Museum.

Ghinallelia globifera (Bergroth), new combination

Figure 150A–N, Q

Ghilianella globifera BERGROTH, 1906a, p. 319.

Maldonado (1960) supplemented the original description of the male with that of the

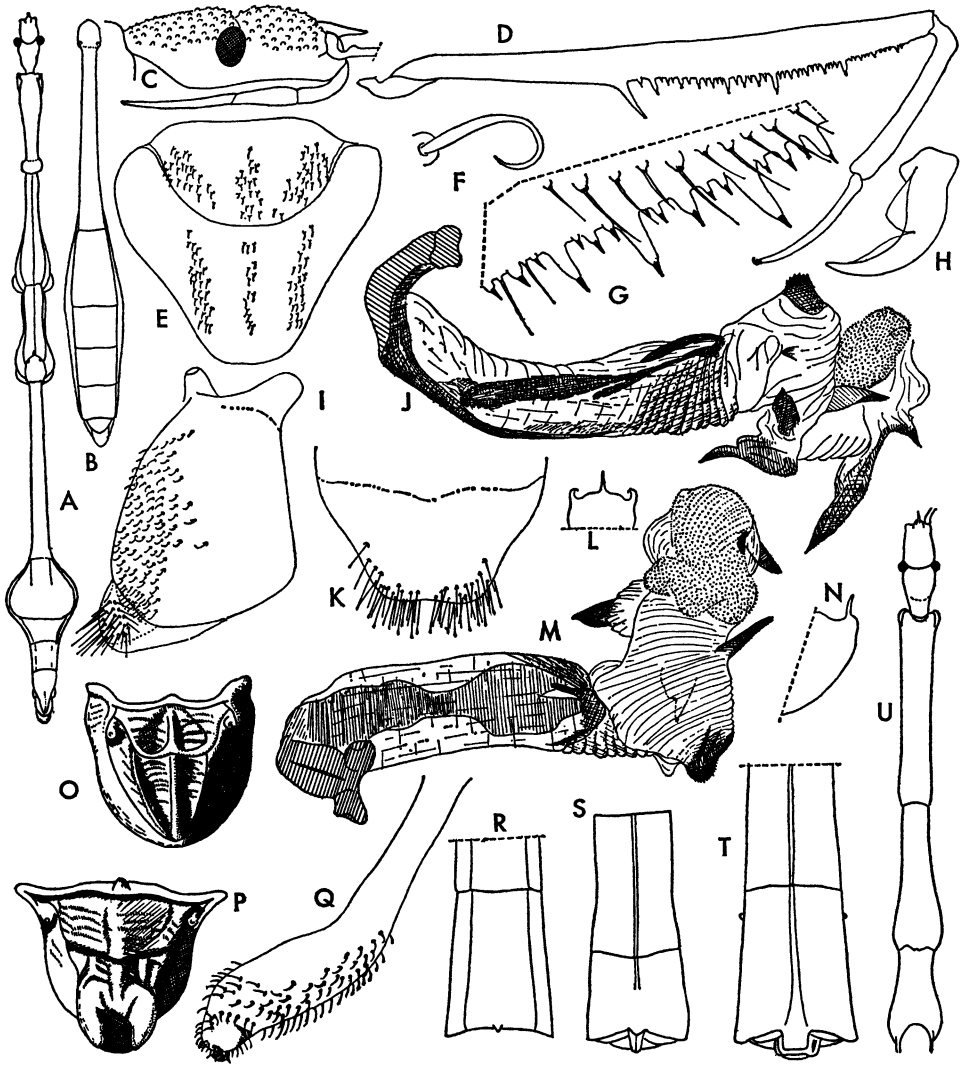


FIG. 150. A–N. *Ghinallelia globifera*. A. General aspect of male. B. Abdomen of female, dorsal view. C. Head of male, lateral aspect. D. Foreleg. E. Eighth and ninth tergites of female, as seen in slide mount. F. Seta of eighth sternite of female. G. Base of series of fore femur. H. Claw of hind leg. I. Gonocoxite with gonapophysis. J. Phallus, lateral view. K. Syngonapophysis. L. Apex of pygophore, seen from behind. M. Phallus, dorsal view. N. Apical half of pygophore, lateral aspect. O. *Ghinallelia brasiliensis*, female, genital region, seen from behind. P. *Ghinallelia signoreti*, female, genital region, seen from behind. Q. *Ghinallelia globifera*, paramere. R, S. *Ghinallelia brasiliensis*, female. R. Apex of abdomen, dorsal view. S. Apex of abdomen, ventral aspect. T. *Ghinallelia signoreti*, female, apical portion of abdomen, ventral view. U. *Ghinallelia brasiliensis*, female, head and thorax, seen from above.

female. The species, selected as the type of the new genus *Ghinallelia*, is here illustrated in some detail. The modified setae, the structure of the tibia and tarsus of the forelegs, and the shape and chaetotaxy of the mid and hind tarsi are all like those of *Ghilianella filiventris* (see fig. 146C–F, H–J).

MATERIAL EXAMINED: Colombia: Cundinamarca, Monterredondo, 1420 meters (Foerster; the American Museum of Natural His-

tory), nine males, four females; Meta: Villavicencio, February 21, 1956, 920 meters (Schlinger and Ross; the California Academy of Sciences), one male; Macarena, February 21, 1956, 450 meters (H. Sturm; the American Museum of Natural History), one male.

DISTRIBUTION: Venezuela, Colombia.

TYPE: Male, Naturhistoriska Riksmuseet.

Ghinallelia haitiana (Maldonado), new combination

Ghilianella haitiana MALDONADO, 1960, p. 427, figs. 1, 32, 79, 83, 88, 123.

DISTRIBUTION: Haiti.

TYPE: Male, Museum of Comparative Zoölogy.

Ghinallelia lissa (Maldonado), new combination

Ghilianella lissa MALDONADO, 1953, p. 192, figs. 11–13.

DISTRIBUTION: Venezuela.

TYPE: Male, United States National Museum.

Ghinallelia longula (McAtee and Malloch), new combination

Ghilianella longula MCATEE AND MALLOCH, 1925, p. 104, fig. 173.

Maldonado (1960) described and illustrated the hitherto unknown male of this species.

The reference of *longula* from Puerto Rico (Barber, 1939) is based on a misidentified specimen. Maldonado (1960) described Barber's Puerto Rican material as *borincana*.

DISTRIBUTION: Cuba.

TYPE: Female, United States National Museum.

Ghinallelia maculata (McAtee and Malloch), new combination

Ghilianella maculata MCATEE AND MALLOCH, 1925, p. 108, figs. 185, 186.

DISTRIBUTION: Cuba.

TYPE: Male, United States National Museum.

Ghinallelia mariae (Wygodzinsky), new combination

Figure 151A–J

Ghilianella mariae WYGODZINSKY, 1954b, p. 292, figs. 10–25.

This quite aberrant species, which inhabits the arid Peruvian coast, differs from its congeners by its short, almost racket-shaped abdomen (perhaps also found in *galapagensis*), and the peculiar male genitalia, with very short and wide phallotheca, and very numerous linearly arranged endosoma processes (fig. 151B, E, H). The hind tarsi, not mentioned in the original description, are like those of the remaining species of the genus; their claws are shown in figure 151G.

DISTRIBUTION: Peru.

TYPE: Male, Instituto Miguel Lillo.

Ghinallelia minimula (McAtee and Malloch), new combination

Ghilianella minimula MCATEE AND MALLOCH, 1925, p. 105.

Among the material identified as *minimula* by Maldonado (1960), there are clearly several species, which differ by not very conspicuous but constant external characters, including those of the genital region, correlated with very clearcut differences in the structure of the phallus. The parameres of all these species are characterized by the presence of a slender, pointed, subapical process (as shown in fig. 149B). The range of this group of species extends over most of Brazil, Paraguay, and part of Bolivia. With the exception of the Paraguayan material, the specimens that I have examined for the present monograph are more than 17 mm. in length, the maximum size of *minimula* McAtee and Malloch.

DISTRIBUTION: Brazil (Mato Grosso).

TYPE: Male, Carnegie Museum.

Ghinallelia monensis (Maldonado), new combination

Ghilianella monense MALDONADO, 1953, p. 195, figs. 17, 18.

The male was described by Maldonado in 1953, and the female by him in 1960.

DISTRIBUTION: Puerto Rico (Mona Island).

TYPE: Male, United States National Museum.

Ghinallelia nanna (Maldonado), new combination

Ghilianella nanna MALDONADO, 1960, p. 432, figs. 48, 71, 91, 111.

Bernardo Irigoyen, given by Maldonado (1960) as the name of the collector of this species, is a town in Misiones where the specimen was obtained.

DISTRIBUTION: Argentina (Misiones).

TYPE: Female, United States National Museum.

Ghinallelia pascoei (Bergroth), new combination

Ghilianella pascoei BERGROTH, 1906a, p. 315.

DISTRIBUTION: Venezuela; Trinidad.

TYPE: Male, Museum Zoologicum Universitatis.

Ghinallelia persimilis (McAtee and Malloch), new combination

Ghilianella persimilis MCATEE AND MALLOCH, 1925, p. 103, figs. 170–172.

DISTRIBUTION: Cuba.

TYPE: Male, United States National Museum.

Ghinallelia personata (McAtee and Malloch), new combination

Ghilianella personata MCATEE AND MALLOCH, 1925, p. 108, fig. 177.

DISTRIBUTION: Brazil (Mato Grosso).

TYPE: Male, Carnegie Museum.

Ghinallelia productilis (Barber), new combination

Figure 149E–K

Ghilianella productilis BARBER, 1914, p. 502.

This is the only species of *Ghinallelia* found in the United States; it is clearly a neotropical element. The general aspect and some details of the morphology of the male are illustrated here. The claws of the forelegs and the tarsus of the mid and hind legs are as usual in the genus. The hind claws are slender, not much curved, and their ventral lamella is low but distinct. The posterior process of the pygophore is spinelike when seen from behind (fig. 149J). The modified setae are rounded apically, a character not found in any other species examined for it.

MATERIAL EXAMINED: United States: Alabama: Mobile, December 22, 1934 (E. Van Duzee; the California Academy of Sciences), one female.

DISTRIBUTION: Cuba; Bahamas; United States (Florida, Alabama).

TYPE: Female, the American Museum of Natural History.

Ghinallelia rhabdita (Maldonato), new combination

Ghilianella rhabdita MALDONADO, 1960, p. 435, figs. 15, 29.

DISTRIBUTION: Brazil (Espirito Santo).

TYPE: Male, United States National Museum.

Ghinallelia semipallida (Bergroth), new combination

Ghilianella semipallida BERGROTH, 1906a, p. 317.

DISTRIBUTION: Venezuela.

TYPE: Female, Museum Zoologicum Universitatis.

Ghinallelia signoreti (Dohrn), new combination

Figure 150P, T

Emesa signoreti DOHRN, 1860, p. 238, fig. 1.
Ghilianella signoreti: LETHIERRY AND SEVERIN, 1896, p. 72.

Wygodzinsky (1951a) redescribed and illustrated the female, and Maldonado (1960) illustrated both sexes. Some of the illustrations given by Wygodzinsky (1951a) are used again here.

MATERIAL EXAMINED: Jamaica: Mandeville, April 1, 1906 (Van Duzee; the California Academy of Sciences), one female.

DISTRIBUTION: Jamaica.

TYPE: Female, Naturhistorisches Museum Wien.

Ghinallelia simillima (McAtee and Malloch), new combination

Ghilianella simillima MCATEE AND MALLOCH, 1925, p. 102.

DISTRIBUTION: Cuba; Honduras.

TYPE: Male, Muséum National d'Histoire Naturelle.

Ghinallelia succincta (McAtee and Malloch), new combination

Ghilianella succincta MCATEE AND MALLOCH, 1925, p. 105.

DISTRIBUTION: Brazil (Pará; Estado do Rio).

TYPE: Female, Carnegie Museum.

FIG. 151. A–J. *Ghinallelia mariae*. A. Female, general aspect. B. Phallus, dorsal view. C. Claws of foreleg. D. Foreleg. E. Phallus, lateral view; phallosoma extended and endosoma partially everted. F. Paramere. G. Claw of hind leg. H. Phallus, lateral aspect; endosoma not everted. I. Genital region of female, posterior view. J. Apex of pygophore, seen from behind. K–N. *Ghinallelia varicornis*. K. Phallus, lateral view. L. Phallus, dorsal aspect. M. Apex of pygophore, seen from behind. N. Paramere.

Ghinallelia varicornis (Dohrn), new combination

Figure 151K–N

Emesa varicornis DOHRN, 1860, p. 226.
Ghilianella varicornis: STÅL, 1862, p. 504.

The most important features of the genitalia of the male are shown here.

DISTRIBUTION: Puerto Rico.

TYPE: Unknown.

Ghinallelia zomata (Maldonado), new combination

Ghilianella zomata MALDONADO, 1963, p. 64, figs. 4–11.

DISTRIBUTION: Male, United States National Museum.

TYPE: Male, United States National Museum.

HORNYLIA, NEW GENUS

DESCRIPTION: Apterous male: Small species (8 mm.).

Body surface dull, slightly granulated. Setae sparse and short; modified setae slender, pointed.

Head with anteocular region longer than postocular, former strongly narrowed anteriorly, latter rounded behind in dorsal view. Clypeal spine absent, labrum transformed into flap covering base of rostrum. Eyes small, remote from level of upper and lower surfaces of head. Interocular furrow strongly curved backward, reaching much behind level of posterior border of eyes. Rostrum only very faintly bent between first and second segments, which are very slightly swollen. First segment longest, reaching level of anterior border of eyes; second about one-third as long as first, third twice as long as second. Antennae inserted about at middle of anteocular portion.

Prothorax subcylindrical, distinctly widened toward anterior third; hind lobe of pronotum extremely short, faintly indicated. Mesonotum and metanotum each somewhat longer than wide, subequal in size, combined shorter than pronotum.

Forelegs stout. Femur with three series of spiniferous processes bearing short, apical spines. Posteroventral series beginning a short distance from base of article, composed of several very large and numerous small processes. Anteroventral series beginning shortly apicad of posteroventral series, widely interrupted at base, consisting of several medium-sized and numerous small processes. Accessory series composed exclusively of small processes. Fore tibia slightly shorter than femur, ventrally with short, heavily sclerotized denticles. Fore tarsus about as long as tibia, slightly curved, not segmented, ventrally with one series of deflexed, knifelike setae. One claw only, simple in structure. Mid and hind legs slender, their tarsi short and stout, second segment shortest; claws not examined.

Abdomen with sides subparallel. Seventh tergite covering pygophore completely from above. Seventh sternite large, completely exposed. Phallus small, asymmetrical. Basal plates separated; dorsal connectives and capitate processes very complex. Phallosoma sclerotized dorsally; endosoma with strongly sclerotized, partly asymmetrical, hooklike structures.

TYPE SPECIES: *Hornylia nalanda*, new species.

ETYMOLOGY: Named for its collector, Walter Horn, with the addition of the last four letters of *Bargylia*, a genus of the Emesinae.

DISTRIBUTION: Ceylon.

OBSERVATIONS: *Hornylia* is probably related to *Bargylia*, from which it can be separated easily by the presence of an accessory series on the fore femur and the existence of a single claw on the forelegs. The very different structure of the male genitalia, viz., the absence of the elongate basal plate struts running along the entire ventral surface of the phallosoma in *Bargylia* and the complex, somewhat asymmetrical structures pertaining to the endosoma, has been the factor in my decision to name a new genus for the only species that is included.

Hornylia nalanda, new species

Figure 152A–P

DESCRIPTION: Male: Length of body, 8 mm.; head, 1; thorax 3; abdomen, 4 mm.

Color of head above and below testaceous, piceous on sides; rostrum piceous, first segment flavescent on posterior half, with exception of dark, median, longitudinal fascia which does not reach hind border of segment. Antennae fuscous, first segment flavescent on basal half, dark and light portions not distinctly separated. Fore coxa stramineous; trochanter stramineous, darker in center; femur stramineous, with four fuscous annuli: one subbasal, two submedian, and one apical, with spiniferous processes stramineous; tibia and tarsus fuscous. Mid and hind femora stramineous, with two rather wide, fuscous annuli, one situated beyond middle, somewhat indistinct, and one subapical, very dis-

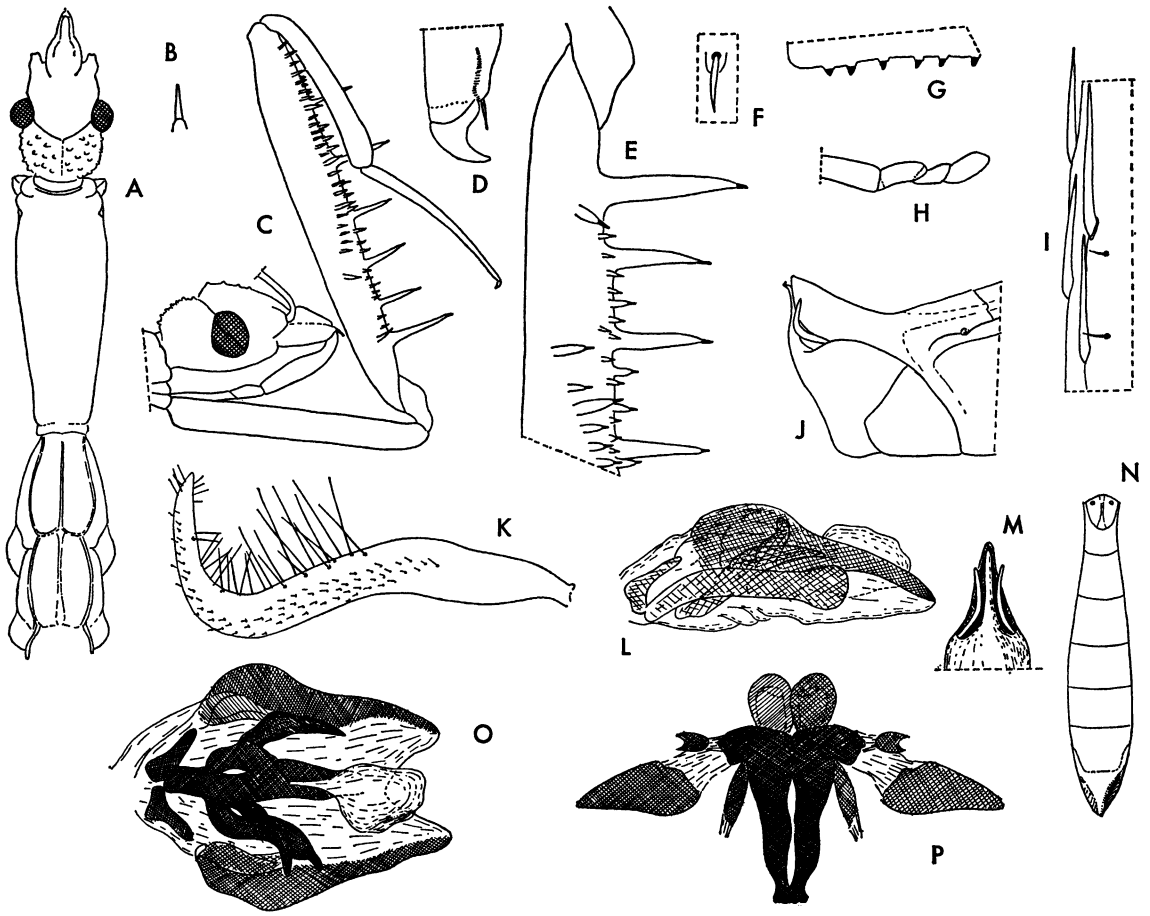


FIG. 152. *Hornylia nalanda*, male. A. Head and thorax, dorsal view. B. Labrum. C. Head and foreleg, lateral aspect. D. Apex of fore tarsus, with claw. E. Base of fore femur. F. Seta of posterior femur. G. Denticles of under surface of fore tibia. H. Outlines of apex of tibia and tarsus of mid leg. I. Spines of under surface of fore tarsus. J. Genital region, lateral view. K. Paramere. L. Phallosoma, lateral aspect. M. Apex of pygophore, seen from behind. N. Abdomen, dorsal view. O. Phallosoma, dorsal view, opened along dorsal midline to expose endosoma. P. Articulatory apparatus.

tinct, latter separated from apex by a very narrow, light-colored annulus. Tibia ochraceous, with a narrow, flavescent annulus at base. Thorax stramineous dorsally, piceous on sides and below. Abdomen stramineous above, finely and irregularly mottled with reddish and brown; piceous on ventral surface; hind border of eighth sternite above, and process of pygophore stramineous; parameres testaceous, shining. Body surface slightly granulated, with sparse, short setae.

Head as shown in figure 152A, C, hind lobe rather strongly granulate on dorsum. Rostrum as shown in figure 152C, shiny. Eyes small, their distance dorsally about two and one-half times their width. Antenniferous processes pronounced, lacking external process. Antennae slender, bare; length of first segment, 3.3 mm.; relative length of segments, 1/0.7/0.18/?.

Thorax as given in generic description and shown in figure 152A, C. Mesonotum and metanotum distinctly carinate longitudinally along middle.

Forelegs as given in generic description and shown in figure 152C–E, G, I. Coxa three-fourths as long as head and as long as pronotum, parallel-sided. Femur less than twice as long as coxa, relatively stout, almost parallel-sided. Distance of first process of postero-

ventral series from base of article less than length of process; remainder of series composed of five processes somewhat shorter than basal one, subequal in size, and numerous small ones. Anteroventral series largely interrupted near base, composed of about five medium-sized and 20 small processes. Accessory series composed of about 40 processes arranged in two irregular rows. Length of tibia somewhat less than half of length of femur, ventrally with about 14 denticles (fig. 152G). Tarsus and claw as given in generic description and shown in figure 152C, D, I. Setae of femora of mid and hind legs as shown in figure 152F; posterior femora surpassing apex of abdomen by about 2 mm.

Shape of abdomen as shown in figure 152N, moderately widened toward hind third. Tergites without trace of tubercles on hind margins. Seventh tergite tongue-shaped, elevated in middle behind and compressed laterally. Genital region as shown in figure 152J, M, N. Pygophore with an elongate, slender posterosuperior process which is delicately hooked apically. Parameres slender, sickle-shaped apically, their exact shape and chaetotaxy as shown in figure 152K. Phallus as given in generic description and illustrated in figure 152L, O, P; endosoma with two hook-shaped processes on right and one on left side.

MATERIAL EXAMINED: Ceylon: Nalanda (Horn; the American Museum of Natural History), one male holotype.

ISCHNOBAENA STÅL

Ischnobaena STÅL, 1871, p. 703.

DESCRIPTION: Apterous. Very slender and elongate, parallel-sided insects. Very large species (30–37 mm.).

Body surface smooth, not shining or tuberculate. Setae sparse and very short, modified setae delicately pointed apically. General color testaceous to piceous or black, in some cases anterior and posterior apex of body differently colored from rest.

Head subfusiform, elongate, anteocular and postocular region of about identical length. Postocular region with sides undulate, gradually converging posteriorly in dorsal view. Labrum in shape of very short and rarely conspicuous spine or flap. Eyes very small; interocular furrow not or barely surpassing level of posterior border of eyes. Rostrum straight or almost straight; first segment attaining level of anterior border of eyes; second slightly less than half as long as first, third slightly shorter than first. Antennae inserted near apex of head.

Thorax very slender and elongate. Pronotum subcylindrical, only slightly widened anteriorly; its hind lobe very short, collarlike but distinct. Mesonotum somewhat shorter than pronotum; metanotum as long as or longer than pronotum; mesonotum and metanotum combined much longer than pronotum.

Forelegs delicate. Spiniferous processes of femur beginning somewhat beyond middle of article. Posteroventral series beginning with very long process, followed by series of several shorter, intermixed with very numerous small ones, latter very short and toothlike on apical portion of femur. Anteroventral series interrupted at base, composed of medium-sized and small processes. Tibia one-fourth of length of femur, its ventral surface with one series of small, strongly sclerotized, peglike to toothlike denticles. Fore tarsus somewhat more than half as long as tibia, not segmented, strongly sclerotized, virtually bare above and at sides, ventrally with two series of deflexed spiniform setae, which are short at basal, and slender and elongate on apical, portion of tarsus. Two simple claws of subequal size, their under surface with a medially incised, low lamella. Mid and hind legs slender, hind femora not attaining, attaining, or slightly surpassing apex of abdomen. Mid and hind tarsi with basal segment somewhat longer than either second or third, second shortest. Claws slender, moderately curved, under surface like that of fore claws.

Abdomen with sides parallel, very slender, slightly narrowed subbasally, faintly widened at apex, keeled below on most segments. First tergite subsemicircular. Genital region in both sexes not elevated in relation to longitudinal axis of body.

Male: Last tergite reaching apex of pygophore. Eighth sternite large, emarginated at center behind, fully exposed; regions bearing spiracles incompletely separated from rest of sternite. Pygophore short, subsemicircular in lateral view; anterior dorsal bridge very short; posterosuperior border somewhat salient in middle, truncate apically. Parameres

elongate, slender, with simple bristles. Phallus symmetrical. Articulatory apparatus short; basal plates connected to phallosoma somewhat caudad of its anterior margin. Phallobase simple in structure, subglobular basally, strongly sclerotized and elongate-pointed apically; its opening situated posteroventrally. Endosoma membranous, simply tubular, coiled within basal portion of phallobase when in rest, several times length of phallosoma when everted.

Female: Eighth tergite subtriangular, its basal half horizontal, its apical half in some cases bent downward. Ninth tergite subvertical, almost completely hidden by eighth in dorsal view, its central portion salient posteriorly. Gonocoxites completely fused; gonapophyses separated. Syngonapophysis incised apically.

TYPE SPECIES: *Ischnobaena macerrima* Stål (by subsequent designation, Distant, 1903e).

DISTRIBUTION: Oriental Region.

OBSERVATIONS: As understood here, *Ischnobaena* is restricted to three closely related species from the southeastern portion of the Oriental Region. It is shown elsewhere that other species described as *Ischnobaena* from Ceylon, tropical Africa, and Madagascar must be placed in different genera.

KEY TO THE SPECIES OF *Ischnobaena*

1. Males 2
   Females 4
2. Parameres large (fig. 153P, R), their apical portion wide, truncate distally and with a conspicuous, small, toothlike projection (fig. 153AA) . . . . . *staliana*
   Parameres small (fig. 153II, JJ), their apical region narrowed, pointed distally (fig. 153GG) 3
3. Last abdominal segments concolorous with rest of abdomen, which is castaneous . . *dohrni*
   Last abdominal segments conspicuously orange-brown, contrasting strongly with rest of abdomen, which is piceous . . . . . *macerrima*
4. Seventh sternite trilobate behind at center (fig. 153 O); eighth tergite wider than long when seen from above, not distinctly carinate apically (fig. 153N) . . . . *staliana*
   Eighth sternite simply salient behind at center (fig. 153MM); eighth tergite at least as long as wide when seen from above, carinate apically (fig. 153KK) . . . . . *dohrni*

Ischnobaena dohrni Stål

Figure 153JJ–MM

Ischnobaena dohrni STÅL, 1871, p. 703.

The type, a last-instar nymph, has now been examined; it agrees perfectly with the original description. The tip of the abdomen is lacking, which may explain why Stål (1871) did not indicate the sex of his specimen.

It cannot be stated with certainty whether the adult of *dohrni* is still unknown or if it is identical with any of the three species now known from the Philippines in the adult form. Though a considerable difference in the color patterns is often apparent when adults and nymphs of a given species are compared, it is generally found that leg annulations, when present, are more conspicuous in the nymphs than in the adult. Thus the nymph of *dohrni*, the legs of which virtually lack light-colored annuli, seems not to correspond to the species described below as *staliana*, the legs of which are distinctly annulated. Thus, only *macerrima* and the species illustrated in figure 153JJ–MM, both of which have concolorous legs, can be considered as possibly representing the adult of *dohrni*. If *macerrima* were considered to be the adult of *dohrni*, these two species would be synonymized, and the other species would require a new name; but if the latter is considered as being the true *dohrni* (a course followed here), the synonymy of *Ischnobaena* does not become unnecessarily burdened.

The adults are rather similar to those of the remaining species from the Philippines. Their main characters are indicated in the key and illustrated here. The size of the male is 33; that of the female, 36.5 to 37 mm. The general color is castaneous, with neither anterior nor posterior extremity of the body lighter; the mid and hind legs are concolorous. The external male genitalia are much like those of *macerrima*, though the pygophore is somewhat more salient in lateral view, and the sides of the eighth sternite are angularly produced and not pointed. The female genitalia are characterized by the rather elongate eighth tergite which is carinate on its apical half, and the seventh sternite which is rounded behind and has a small salience at the middle of the posterior margin.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF
GG
HH
II
JJ
KK
LL
MM

MATERIAL EXAMINED: Philippines: Samar: Catbalogan (G. Böttcher; Naturhistorisches Museum, Basel), one female; Mindoro: Mt. Balusan, 2000 feet (G. Böttcher; Naturhistorisches Museum, Basel), one female; Mindanao: (Hungarian National Museum), two females.

DISTRIBUTION: Philippines.

TYPE: Nymph, Museum Zoologicum Universitatis.

Ischnobaena macerrima Stål

Figure 153DD–II

Ischnobaena macerrima STÅL, 1871, p. 703, pl. 8, figs. 15, 15a.

The male from Samar agrees very well with the original description and the type, which I have examined. It is slightly smaller (34 versus 36.5 mm.). Its genital region is illustrated here. The lateral border of the eighth sternite is conspicuously pointed; the parameres are small, pointed apically; the posterior portion of the phallosoma is distinctly bifurcate.

MATERIAL EXAMINED: Philippines: Samar: Catbalogan (G. Böttcher; Naturhistorisches Museum, Basel), one male.

DISTRIBUTION: Philippines.

TYPE: Male, Museum Zoologicum Universitatis.

Ischnobaena staliana, new species

Figure 153A–Z, AA–CC

DESCRIPTION: Length of male, 36; of females, 37–38 mm.; length of head, 7; pronotum, 5; mesonotum, 4.7; metanotum, 5.2; abdomen, 19.4 mm.

General color piceous; head, acetabula, antennae, apex of mesonotum and metanotum, mid and hind legs, and base of abdomen dorsally all castaneous. Pronotum shortly before middle with 1+1 stramineous spots; similar spots submedially at hind border and laterally at base of thoracic tergites. Under surface of head and entire rostrum testaceous. Forelegs castaneous to piceous; basal fifth of coxa stramineous; femur darkened toward apex, tibia with a wide, submedian, stramineous annulus; tarsus whitish on basal three-fifths. Mid and hind femora with four to five widely spaced, very narrow, stramineous annuli; three similar annuli on basal half of tibiae. Surface of body smooth.

Head and rostrum as shown in figure 153A–C; labral spine slightly salient. Apex of first rostral segment attaining level of anterior border of eyes. Length of first segment of antennae (male holotype), 15 mm.; relative length of segments, 1/0.85/0.03/0.17.

Thorax as given in generic description and illustrated in figure 153A; measurements as given above; nota without dorsal carinae.

Forelegs as given in generic description and shown in figure 153D, F, H, J, K. Coxa somewhat longer than prothorax. Mid and hind legs as given in generic description and shown in figure 153E, G, I; hind femora surpassing apex of abdomen by 1 or 2 mm.

Abdomen of male as given in generic description and shown in figure 153A; that of female very slightly more widened apically, its surface microscopically reticulate. External genitalia of male as shown in figure 153P, R, S, BB; lateral portions of eighth

---

FIG. 153 (OPPOSITE PAGE). A–Z, AA–CC. *Ischnobaena staliana.* A. Male, general aspect. B. Head of male, dorsal view. C. Head of male, lateral aspect. D. Foreleg. E. Seta of hind femur. F. Detail of under surface of fore tibia. G. Claws of hind leg. H. Base of series of fore femur. I. Posterior tarsus. J. Spines of basal portion of under surface of fore tarsus. K. Apex of fore tarsus, with claws. L. Base of abdomen, dorsal view. M. Apex of abdomen of female, side view. N. Apex of abdomen of female, seen from above. O. Genital region of female, ventral aspect. P. Genital region of male, side view. Q. Lateral portion of eighth sternite of male, as seen on slide mount; setae not shown. R. Genital region of male, dorsal view. S. Genital region of male, ventral aspect. T. Gonocoxite with gonapophysis. U. Genital region of female, seen from behind. V. Ninth tergite of female, as seen on slide mount. W. Posterior gonapophysis. X. Syngonapophysis. Y. Apex of median projection of ninth tergite of female, high magnification. Z. Articulatory apparatus. AA. Paramere. BB. Pygophore, seen from behind. CC. Phallus, lateral view. DD–II. *Ischnobaena macerrima,* male. DD. Apex of abdomen, dorsal view. EE. Phallus, lateral aspect. FF. Apex of abdomen, seen from below. GG. Paramere. HH. Pygophore, seen from behind. II. Genital region, lateral view. JJ–MM. *Ischnobaena dohrni.* JJ. Genital region of male, lateral aspect. KK. Apex of abdomen of female, dorsal aspect. LL. Apex of abdomen of female, lateral view. MM. Genital segments of female, ventral aspect.

sternite broadly rounded; pygophore rather short in lateral view. Parameres large (fig. 153P, R), apically truncate and with a distal projection (fig. 153AA). Phallus as shown in figure 153CC; apical portion of phallosoma not perceptibly bifid. Basal plates connected to roof of pygophore by a complex membranous structure (fig. 153Z). External genitalia of female as shown in figure 153M–O, U; seventh sternite strongly projecting behind, its apex trilobate. Eighth tergite shorter than wide in dorsal view, not carinate along middle. Details of ninth tergite and genital appendages as shown in figure 153T, V–Y.

MATERIAL EXAMINED: Philippines: Luzon: Tayabas Province: Luchan, May, 1962 (R. C. McGregor; United States National Museum), one male holotype, one female allotype, one male paratype; (R. C. McGregor; the American Museum of Natural History), one male paratype; Luzon: Mt. Maquiling, November, 1945, 1700 feet (B. Malkin; United States National Museum), one female paratype; Luzon: Majayjay, Kaguna, May 30, 1928 (R. Rivera; United States National Museum, *ex* collection R. C. McGregor), one female paratype.

OBSERVATIONS: This species is well characterized by its color pattern and the morphology of the genitalia in both sexes.

ISCHNOBAENELLA, NEW GENUS

DESCRIPTION: Apterous. Extremely slender and elongate, filiform insects. Large to very large species (21–33 mm.).

Body surface from shining to minutely granulate. Setae sparse and very short; modified setae delicately pointed apically, often inserted on small tubercles. General color piceous, rarely flavous, not conspicuously marked, but in some cases anterior and posterior extremities of body differently colored from rest. Eyes red.

Head subfusiform, elongate, anteocular and postocular regions of about equal length. Postocular region with sides slightly undulate, faintly to distinctly converging posteriorly in dorsal view. Labrum small, covering base of rostrum, not salient. Eyes very small; interocular sulcus not surpassing level of posterior border of eyes. Rostrum straight or almost so; first segment not attaining level of anterior border of eyes, second very short, third somewhat longer than first. Antennae inserted near apex of head.

Thorax slender and extremely elongate. Pronotum subcylindrical, only faintly widened anteriorly, hind lobe collar-like but distinctly separated from fore lobe. Mesonotum much shorter than pronotum; metanotum as long as or slightly shorter than pronotum; mesonotum and metanotum combined much longer than pronotum.

Forelegs very delicate. Spiniferous processes bearing short, apical spines beginning at middle of femur, their structure and distribution as in *Ischnobaena*. Tibia not more than one-fourth of length of femur, its ventral surface with a series of short, peglike or apically blunt, strongly sclerotized denticles. Fore tarsus two-segmented, slightly more than half as long as tibia, apical segment slightly less than half as long as basal one; tarsus strongly sclerotized, its chaetotaxy as in *Ischnobaena*. Claws like those of *Ischnobaena*. Mid and hind legs slender, hind femora not quite attaining apex of abdomen. Mid and hind tarsi much like those of *Ischnobaena*, claws somewhat more strongly curved.

Abdomen filiform, microscopically rugose, keeled below on most segments. Genital region of both sexes not elevated in relation to longitudinal axis of abdomen.

Male: Last tergite not quite reaching apex of pygophore. Eighth sternite large, emarginated at center behind; region bearing spiracle completely separated from rest of sternite. Pygophore short, subsemicircular in lateral view; anterior dorsal bridge very short; posterosuperior border slightly salient in middle. Parameres elongate, with bristles and small sensory cones arranged in single longitudinal row. Phallus like that of *Ischnobaena*.

Female: Eighth tergite subtriangular; ninth tergite transverse, salient at middle behind, completely or almost completely hidden by eighth in dorsal view. Gonocoxites in intimate contact but not fused; gonapophyses separated. Syngonapophysis emarginated apically.

TYPE SPECIES: *Emesa invisibilis* Dohrn.

ETYMOLOGY: Diminutive of *Ischnobaena*, a genus of the Emesinae.

DISTRIBUTION: Oriental Region.

OBSERVATIONS: *Ischnobaenella* is obviously very closely related to *Ischnobaena*. Neither

of the two genera can have been derived from the other, as each possesses different autapomorphic characters: the fused lobes of the eighth sternite of the female in *Ischnobaena*, and the completely separated sclerite bearing the spiracle of the eighth sternite of the male and the presence of sensory cones on the parameres in *Ischnobaenella*. At the present time it cannot be decided whether the two-segmented condition of the fore tarsus of *Ischnobaenella* is a primitive or a secondarily derived character; the latter does not seem impossible. Attention is here called to *Ischnobaenella naraikkadu*, in which the division of the fore tarsus, though perceptible, is not very distinct; the completely separated gonocoxites, however, place the species unequivocally in *Ischnobaenella*.

Two-segmented fore tarsi are also found in *Pseudobargylia* and some species of *Jamesa*, but these genera are not closely related to *Ischnobaenella*, which can be distinguished from *Pseudobargylia* by the longer fore tarsus (only about one-third of the tibial length in *Pseudobargylia*), the metanotum which is longer than the mesonotum, the spines of the parameres, and the quite different structure of the phallus (see figs. 155R; 168I; 169N). In the female of *Ischnobaenella*, the subtriangular eighth tergite covers the ninth completely or almost completely; the eighth tergite of the female of *Pseudobargylia* is truncate behind and leaves the ninth completely exposed. *Jamesa* can be distinguished from *Ischnobaenella* by the very different male genitalia (see figs. 157L; 155R), the apically emarginate eighth tergite of the females which covers the gonocoxites laterally, as well as by the triangular projection at the base of the claws of the mid and hind legs.

A fourth- or fifth-instar nymph [Singapore, 1910, British Museum (Natural History)] also shows the two-segmented fore tarsus.

An unidentified species of *Ischnobaenella* is illustrated in figure 5 on plate 2.

KEY TO THE SPECIES OF *Ischnobaenella*

1. Head and body uniformly flavous . . . . . *polymela*
   Abdomen completely or almost completely dark 2
2. Abdomen dark, its apex conspicuously light-colored from seventh segment on (fig. 155A, X, Y) . . . . . *invisibilis*
   Abdomen dark, its apex concolorous, or at most with some small, light spots on apical tergites (fig. 154BB) 3
3. Head uniformly ochraceous . . . *jawalagiri*
   Head with conspicuous dark and light pattern (fig. 154H, I, W, X) 4
4. Forelegs light brown, pattern elements faint or imperceptible 5
   Forelegs dark piceous, with conspicuous stramineous markings (fig. 154K) . . . *gressitti*
5. Mid and hind coxae brown, contrasting with blackish thorax; sides of postocular region of head not strongly converging posteriorly (fig. 154A); eighth tergite of female longer than wide, its apical portion compressed laterally (fig. 154C–E). . . . *brunneiceps*
   Mid and hind coxae black as thorax; sides of postocular region of head distinctly converging posteriorly (fig. 154X); eighth tergite of female not longer than wide, its apical portion not compressed laterally (fig. 154AA–CC). . . . . *naraikkadu*

Ischnobaenella brunneiceps (Breddin), new combination

Figure 154A–G

Ischnobaena brunneiceps BREDDIN, 1912, p. 406.

The specimens that I have examined agree well with the original description. Some of the differential characters of the species are illustrated here. The female genitalia differ from those of *invisibilis*, the type species, by the difference in shape of the eighth tergite, which is distinctly longer than wide, the longer eighth sternite, and the different shapes of the ninth tergite and syngonapophysis. The thorax of *brunneiceps* is also much shorter than in *invisibilis*.

MATERIAL EXAMINED: South India: Travancore: Thekkadi, Periyar Dam, May 6–10, 1937 [British Museum (Natural History)], one female. No locality given (the American Museum of Natural History), four females.

DISTRIBUTION: Ceylon; South India.

TYPE: Unknown.

Ischnobaenella gressitti, new species

Figure 154H–P

DESCRIPTION: Male: Length, 29.1 mm.; head, 15; prothorax, 4.5; mesothorax, 2.6; metathorax, 4; abdomen, 16.5 mm.

General color of thorax and abdomen piceous, almost black; pronotum tinged with reddish anteriorly. Head luteous, marked with fuscous laterally and dorsally (fig. 154H, I).

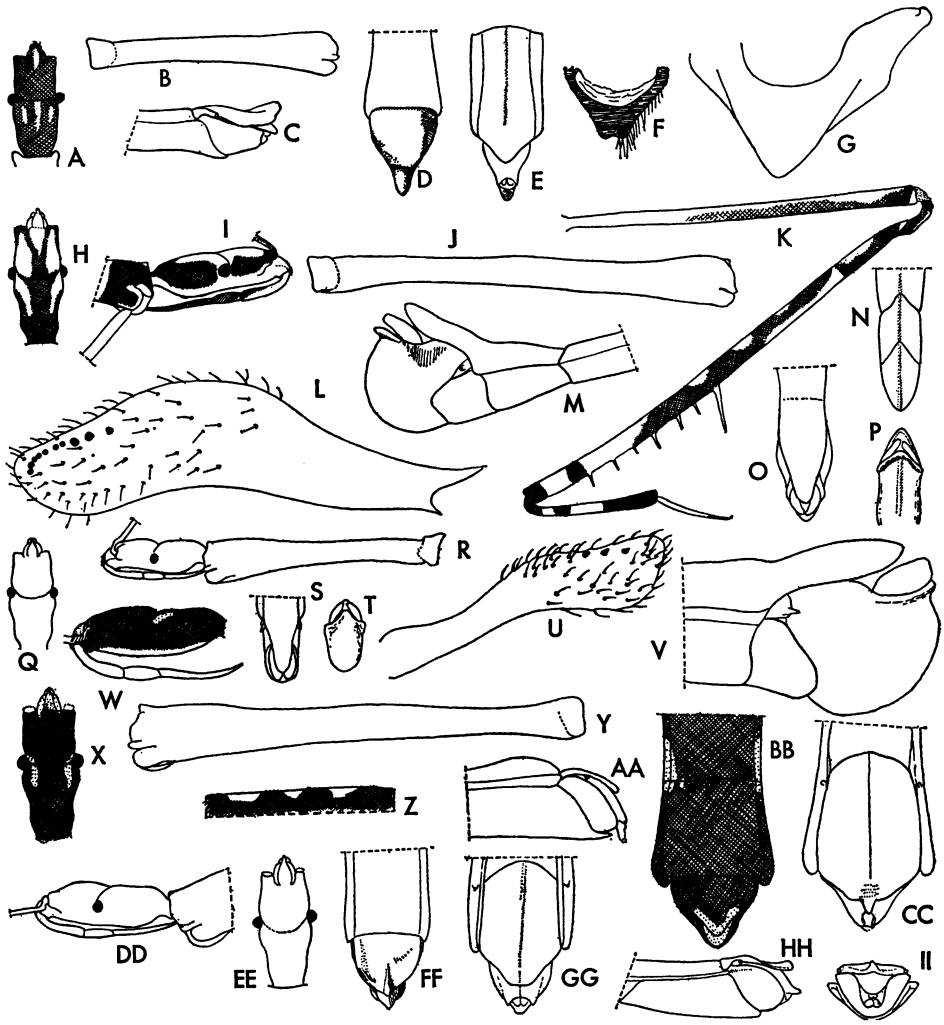


FIG. 154. A–G. *Ischnobaenella brunneiceps*, female. A. Head, dorsal aspect, with color pattern. B. Prothorax, lateral view. C. Apex of abdomen, lateral view. D. Genital region, seen from above. E. Genital segments, ventral view. F. Syngonapophysis. G. Ninth tergite, as seen in slide mount; setae not shown. H–P. *Ischnobaenella gressitti*, male. H. Head, seen from above, with color pattern. I. Anterior portion of body, lateral view, with color pattern. J. Prothorax, lateral aspect. K. Foreleg, with color pattern. L. Paramere. M. Genital region, lateral aspect. N. Apex of abdomen, seen from below. O. Genital region, seen from above. P. Pygophore, posterior view. Q–V. *Ischnobaenella jawalagiri*, male. Q. Head, seen from above. R. Head and prothorax, side view. S. Genital region, dorsal aspect. T. Pygophore, seen from behind. U. Paramere. V. Genital region, lateral view. W–Z, AA–CC. *Ischnobaenella naraikkadu*, female. W. Head, lateral view, with color pattern. X. Head, seen from above, with color pattern. Y. Prothorax, lateral aspect. Z. Connexival segment, with color pattern. AA. Genital region, side view. BB. Apex of abdomen, seen from above, with color pattern. CC. Genital segments, seen from below. DD–II. *Ischnobaenella polymela*, female. DD. Head and apex of prothorax, lateral view. EE. Head, seen from above. FF. Apex of abdomen, dorsal view. GG. Genital segments, ventral view. HH. Apex of abdomen, lateral aspect. II. Genital segments, seen from behind.

First rostral segment luteous, its apex and entire second and third segments fuscous. Antennae testaceous, base of first segment narrowly flavescent, apex of first and base of second segments piceous. Collar and anterior border of acetabula of prothorax stramineous. Forelegs fuscous, with stramineous markings (fig. 154K). Coxa of mid and hind legs piceous, concolorous with thorax, remaining articles castaneous; femora becoming piceous toward their apex, with three to four evenly spaced, narrow, whitish annuli; basal half of tibia with three to four similar annuli, two basal ones close to each other. Abdominal tergites each with 1+1 small, stramineous streaks laterally at base. Pygophore fuscous, its posterior carina and apices of parameres flavescent. Body surface smooth, dull; head subshining; abdomen delicately striate longitudinally, ninth tergite coarsely rugose transversally.

Head and rostrum as shown in figure 154H–I. Sides of postocular region of head conspicuously converging posteriorly. Length of first segment of antennae, 14.5 mm.; relative length of segments, 1/0.95/0.02/0.14.

Thorax as given in generic description, very slender; measurements of segments as given above. Prothorax nine times as long as maximum height in lateral view(fig. 154J). Mesonotum and metanotum along middle with a faint but distinct, linear, longitudinal impression. Forelegs as given in generic description and shown in figure 154K; coxa almost as long as pronotum. Mid and hind legs as given in generic description.

Abdomen as given in generic description. External genitalia as illustrated in figure 154M–P; eighth sternite and pygophore strongly compressed laterally, lateral regions of eighth sternite subangular; spiracle not pedunculate. Pygophore subsemicircular in lateral view, its posterosuperior border distinctly reflexed. Shape and chaetotaxy of parameres as shown in figure 154L, with a row of about 10 short spines. Phallus like that of *invisibilis*.

MATERIAL EXAMINED: China: Hainan Island, Ta Hian, June 16, 1935 (L. Gressitt; the University of Kansas), one male holotype; East Kwantung: Yim Na San, June 11, 1936 (L. Gressitt; the University of Kansas), one incomplete specimen.

OBSERVATIONS: This species, named for its collector, enlarges considerably the known range of the genus. In addition to the differential characters given in the key, the species is characterized by the shape of the pygophore and the shape and chaetotaxy of the parameres.

Ischnobaenella invisibilis (Dohrn), new combination

Figure 155A–Z, AA

Emesa invisibilis DOHRN, 1860, p. 219, figs. 3, 4, 7.

Ischnobaena invisibilis: BREDDIN, 1912, p. 404.

Ischnobaena macerrima: DISTANT, 1903e, p. 213 (*nec* Stål, 1871).

Emesa henrici DOHRN, 1860, p. 218 (new synonymy).

Ischnobaena henrici: DISTANT, 1903e, p. 214.

Bergroth (1906a) considered that this species probably belonged to *Ischnobaena*, but only Breddin (1912), who gave a rather detailed redescription, placed *invisibilis* definitely in *Ischnobaena*, even though correctly describing the anterior tarsus as two-segmented.

The specimens examined agree well with the available descriptions. The general aspect and several morphological characters are herein figured in detail. The eighth sternite of the male is characterized by its broadly rounded lateral portions and the pedunculate spiracles (fig. 155L). The posterosuperior border of the pygophore is simple. The relatively slender parameres bear two or three spines (fig. 155P, S). The strongly sclerotized apical portion of the phallosoma is distinctly bifid (fig. 155R). The external female genitalia are shown in figure 155T, X, Y, AA. The eighth tergite is not longer than wide in dorsal aspect. The seventh sternite is acute apically and almost reaches the center of the hind border of the relatively short eighth sternite. The various sclerites of the abdominal apex of the female, as seen in slide mounts, are shown in figure 155U–W, Z.

Emesa henrici is here synonymized with *invisibilis;* it is apparently based on a nymph ("Der Hinterleib ist . . . zusammenge schrumpft . . ."; Dohrn, 1860) and agrees rather well with the adult of *invisibilis* in those characters that can be compared.

MATERIAL EXAMINED: Ceylon: Henarat-

FIG. 155. *Ischnobaenella invisibilis*. A. Male, general aspect, with color pattern. B. Head and prothorax of male, lateral aspect, with color pattern. C. Head of male, dorsal view. D. Apex of fore tarsus, with claws. E. Fore tarsus. F. Foreleg. G. Outlines of posterior tarsus. H. Base of series of fore femur. I. Seta of eighth sternite of male. J. Denticles of under surface of fore tibia. K. Praetarsus and claw of hind leg. L. Apex of abdomen of male, lateral view. M. Pygophore, seen from behind. N. Genital segments of male, dorsal aspect. O. Genital segments of male, seen from below. P. Paramere. Q. Lateral portion of eighth sternite of male, as seen in slide mount; setae not shown. R. Phallus, lateral view. S. Apex of paramere, high magnification. T. Apex of abdomen of female, side view. U. Ninth tergite of female, as seen in slide mount. V. Gonocoxite with gonapophysis. W. Eighth tergite of female, as seen in slide mount; setae not shown. X. Apex of abdomen of female, seen from above, with color pattern. Y. Apex of abdomen of female, seen from below, with color pattern. Z. Syngonapophysis. AA. Genital segments, seen from behind.

goda, February, 1920 (Dr. Uzel; Naturhistorisches Museum, Vienna), five males, one female; (Dr. Uzel; the American Museum of Natural History), one male; Peradeniya, January 9, 1911 [E. E. Green, British Museum (Natural History)], one female.

DISTRIBUTION: Ceylon.

TYPE: Unknown.

Ischnobaenella jawalagiri, new species

Figure 154Q–V

DESCRIPTION: Male: Length, 21 mm.; head, 1.3; pronotum, 2.5; mesonotum, 2.1; metanotum, 2.5; abdomen, 12.6 mm.

Head, rostrum, antennae, and legs ochraceous. Pronotum testaceous, becoming gradually darker on posterior third, mesonotum and metanotum castaneous, abdomen castaneous to piceous, concolorous. Head and pronotum delicately granulate, mesonotum, metanotum, and abdomen with small but heavy herringbone sculpture.

Head and rostrum as shown in figure 154Q, R. Postocular region distinctly though not strongly convergent posteriorly. Length of first segment of antennae, 9.5 mm.

Thorax as given in generic description; measurements of nota as above. Mesonotum and metanotum on anterior half with a faint, median, longitudinal, impressed line. Prothorax five times as long as maximum height in lateral view (fig. 154R). Legs as given in generic description; division of fore tarsus distinct.

Abdomen narrow at base, somewhat widened toward apex, 15 times as long as maximum width. External genitalia as shown in figure 154S, T, V. Spiracle of eighth sternite peduncular. Pygophore subsemicircular in lateral view, its apical border reflexed, strongly compressed laterally. Parameres (fig. 154U) with three sensory cones. Phallus like that of *invisibilis*.

MATERIAL EXAMINED: India: Jawalagiri, North Salem, Forest Research Institute, Sandal Insect Survey, October 7, 1939 [British Museum (Natural History)], one male holotype.

OBSERVATIONS: The color and the structure of the male genitalia are sufficient to characterize this species.

Ischnobaenella naraikkadu, new species

Figure 154W–Z, AA–CC

DESCRIPTION: Female: Length, 32.5 mm.; head, 1.5; pronotum, 5; mesonotum, 3.5; metanotum, 4; abdomen, 18.5 mm.

Head dark piceous, thorax and abdomen black. Ventral surface of head stramineous, 1+1 spots dorsally behind eyes, clypeus and rostrum ochraceous (fig. 154W, X). Antennae castaneous. Legs light castaneous; fore femora ochraceous on apical third, spiniferous processes stramineous, tibia with one rather narrow, subbasal annulus and one wider submedian annulus all whitish; tarsus whitish on basal two-thirds. Coxae of mid and hind legs black. Connexivum with ochraceous spots arranged in widely separated groups of one, two, three, and one, from base to apex of abdomen. Eighth tergite ochraceous along part of hind margin and on apex; ninth ochraceous at center. Surface of head dull, smooth; thorax and abdomen with very numerous small, longitudinal and diagonal, sculptural elements arranged in herringbone pattern.

Head and rostrum as shown in figure 154W, X. Postocular region conspicuously narrowed posteriorly. Length of first segment of antennae, 14 mm.; relative length of segments, 1/0.85/0.03/0.14.

Thorax as given in generic description, very slender; measurements of nota as given above. Prothorax about eight times as long as maximum height in lateral view (fig. 154Y). Mesonotum and metanotum without median longitudinal impression or ridge. Legs as given in generic description; division of fore tarsus not very distinct.

Abdomen as given in generic description, very narrow at base, gradually widened to apical third, then narrowed again and widened to apex of seventh segment; posterolateral angles of seventh connexival segment distinctly projecting in dorsal view (fig. 154BB). Genital segments as shown in figure 154AA–CC. Eighth tergite in shape of an equilateral triangle, its sides slightly emarginated, disc not elevated. Seventh sternite large, covering most of gonocoxites, at center behind with a conspicuous projection (fig. 154CC). Gonocoxites distinctly separated.

MATERIAL EXAMINED: South India: Naraikkadu, Tinnevelly District, March 9, 1936, 2500 to 3000 feet [B.M.–C.M. Expedition to South India; British Museum (Natural History)], one female.

OBSERVATIONS: This species is characterized by its combination of color and morphological characters.

Ischnobaenella polymela (Kirkaldy), new combination

Figure 154DD–II

Ischnobaena polymela KIRKALDY, 1901, p. 55.

The specimens that I have now examined agree well with the short original description.

The female genitalia are here illustrated. The seventh sternite is salient behind but rather broadly truncate apically; the eighth tergite is completely horizontal, as long as wide, and distinctly carinate along its middle apically; the ninth tergite and eighth sternite are also different from those of the remaining species in which the females are known.

MATERIAL EXAMINED: Malacca: (Staudinger; Museum Zoologicum Universitatis), one female; Singapore: [(H. N. Ridley; British Museum (Natural History)], one female.

DISTRIBUTION: Sumatra; Malaya.

TYPE: Rijksmuseum van natuurlijke Historie.

ISCHNONYCTES STÅL

Ischnonyctes STÅL, 1874, pp. 94 (key), 96.

DESCRIPTION: Apterous. Medium-sized species (15–20 mm.).

Body surface dull, faintly granulate. Setae sparse; modified setae rounded apically. General color from stramineous to piceous; conspicuous markings absent.

Head elongate, subfusiform, slightly depressed dorsoventrally, anteocular and postocular regions of about equal size, in dorsal view with sides subparallel, postocular region abruptly constricted at neck. Clypeus with a large, spiniform projection, labrum with medium-sized to evanescent one. Eyes small; interocular furrow attaining but not surpassing level of posterior border of eyes. Rostrum straight, segments slender. First rostral segment almost twice as long as second, its apex approaching level of anterior border of eyes; third only slightly shorter than first. Antennae inserted near apex of head.

Pronotum longer than either mesonotum or metanotum, subcylindrical, its hind lobe sharply separated from fore lobe, covering extreme base of mesonotum only. Mesonotum very slightly longer than metanotum, both longer than wide, combined length longer than pronotum.

Forelegs moderately stout. Femora almost parallel-sided, slightly widened at level of insertion of large basal process. Spined portion of femur covering two-thirds of length of article. Posteroventral series with several medium-sized and numerous very short spiniferous processes in addition to large basal process, this process longer than diameter of article. Anteroventral series composed of medium-sized to small processes, widely interrupted at base; small process situated basad of interruption inserted slightly apicad of level of large basal process of posteroventral series. Fore tibia two-fifths as long as femur, ventrally with one series of short, simple denticles. Fore tarsus about half as long as tibia, two-segmented, division only faintly discernible; apical segment somewhat shorter than basal. Under surface of tarsus with deflexed spiniform setae arranged in one or two irregular series. Two subequal claws, their ventral lamellae not distinct. Mid and hind femora and tibiae with sparse setae of a single size. Mid and hind tarsi rather stout, with long setae in moderate number; first and third segments of subequal length, second slightly shorter. Claws slender, faintly curved, with low, medially incised, ventral lamella.

Abdomen narrowly fusiform, slightly wider in female than in male; keeled below on most segments. Genitalia of both sexes not elevated in relation to longitudinal axis of abdomen.

Male: Last tergite apically tongue-shaped, not conspicuously reflexed, attaining level of apex of pygophore. Eighth sternite fully exposed. Pygophore elongate, its hind border regularly rounded in lateral view; process of upper border of pygophore apically truncate in posterior view. Parameres medium-sized, approximately rod-shaped, curved subapically, distally with a few spinulets in addition to usual setae. Phallus of normal size, simple in structure, symmetrical. Basal plates separated; a small cephalad-directed, bifurcate sclerite arising from junction of basal plate extension to phallobase. Phallobase subcylindrical, pointed at apex, sclerotized ven-

trally on basal, and entirely on distal, half. Opening of phallobase directed backward. Endosoma membranous, approximately cylindrical, without conspicuous projections, its surface with irregularly arranged, minute, cuticular projections.

Female: Eighth tergite large, about as long as wide, subhorizontal. Ninth tergite distinctly visible from above, elongate, subtriangular, subhorizontal, forming continuous surface with eighth, extending much beyond genital appendages. Gonocoxites and gonapophyses separated. Syngonapophysis slightly projecting posteriorly.

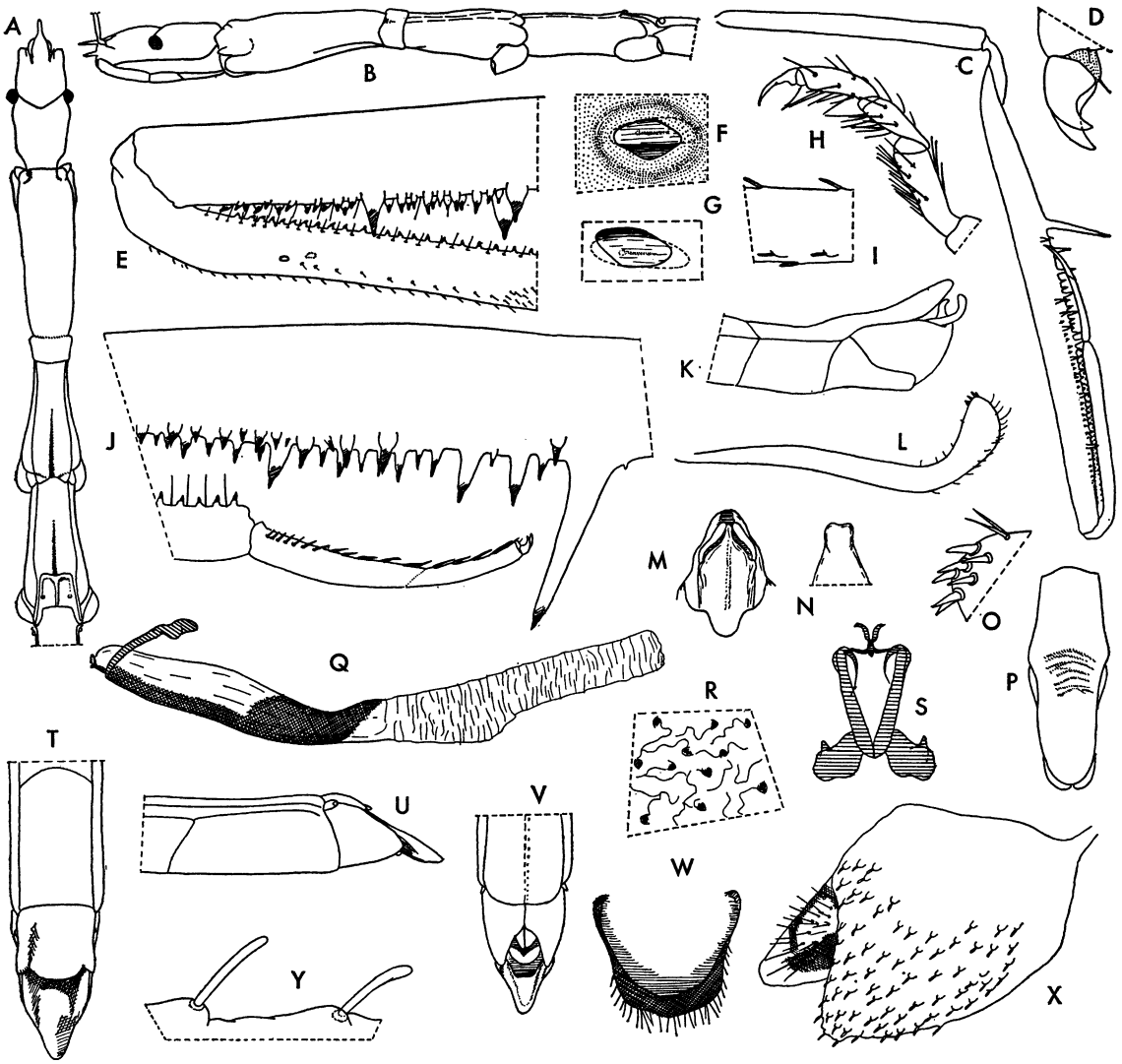


FIG. 156. *Ischnonyctes barbarus*. A. Head and thorax of male, dorsal view. B. Head and thorax of male, lateral aspect. C. Foreleg. D. Claws of foreleg. E. Apex of femur and base of tibia of foreleg, latter showing location of protibial sensory elements. F, G. Protibial sensory elements, high magnification, schematic. H. Tarsus of hind leg. I. Portion of posterior femur. J. Portion of fore femur with apex of tibia and entire tarsus. K. Apex of abdomen of male, lateral view. L. Paramere. M. Pygophore, seen from behind. N. Apical projection of pygophore. O. Apex of paramere, high magnification. P. Seventh tergite of male, seen from above. Q. Phallus, lateral view, with endosoma partially everted. R. Detail of surface structure of endosoma. S. Articulatory apparatus. T. Distal portion of abdomen of female, seen from above. U. Apex of abdomen of female, side view. V. Genital segments of female, seen from below. W. Syngonapophysis. X. Gonocoxite with gonapophysis. Y. Setae of gonocoxite.

TYPE SPECIES: *Emesa barbara* Lucas (monobasic).

DISTRIBUTION: Mediterranean subregion of the Palearctic Region.

OBSERVATIONS: Dispons (1953) has shown that the genus *Ischnonyctes* must be restricted to a single species. Other species formerly described under *Ischnonyctes* and now assigned to different genera can be found by means of the Index of the present paper.

Ischnonyctes, in many respects, is not unlike the Australian *Pseudobargylia*, in general morphology as well as in the structure of the male and female genitalia, even up to the presence of spinulets on the otherwise not modified parameres of the male. I cannot state at this time whether this similarity indicates close relationship or not. *Ischnonyctes* differs from *Pseudobargylia* by the presence of a spiniform projection on the clypeus, and by the fore tarsus, which is about half as long as the tibia (only one-third as long as the tibia in *Pseudobargylia*).

Ischnonyctes barbarus (Lucas)

Figure 156A–Y

Emesa barbara LUCAS, 1849, p. 49.
Ischnonyctes barbarus: PUTON, 1880, p. 167.
Emesa corsicensis SCOTT, 1874, p. 270.
Ischnonyctes corsicensis: PUTON, 1880, p. 167.
Ischnonyctes pallipes REUTER, 1909, p. 3.
Ischnonyctes annulipes REUTER, 1909, p. 4.
Ischnonyctes barbarus corsicensis: DISPONS, 1953, p. 238.
Ischnonyctes barbarus pallipes: DISPONS, 1953, p. 239.
Ischnonyctes barbarus obsoletus DISPONS, 1953, p. 239.
Ischnonyctes barbarus rectangularis DISPONS, 1953, p. 239.
Ischnonyctes barbarus filsi DISPONS, 1953, p. 239.
Ischnonyctes barbarus nigritylus DISPONS, 1953, p. 239.
Ischnonyctes barbarus ornithophilus DISPONS, 1953, p. 239.
Ischnonyctes barbarus apicalis DISPONS, 1953, p. 239.

Dispons (1953) synonymized all Palearctic species with Lucas' *barbarus* but named numerous varieties, admittedly based on individual differences.

The species is illustrated from Algerian specimens; the figures are self-explanatory. The protibial organ, found in many emesines, is here shown in detail (fig. 156E–G).

DISTRIBUTION: Spain; Corsica; Sicily; Turkey; Morocco; Algeria.

TYPES: Of *Emesa barbara*, male, Muséum National d'Histoire Naturelle; of *Emesa corsicensis*, male, British Museum (Natural History); of *pallipes* and *annulipes*, unknown.

JAMESA VILLIERS

Jamesa VILLIERS, 1948, p. 459.

DESCRIPTION: Macropterous or micropterous. Large species (21–26.5 mm.).

Body surface dull, more or less granulate. Setae sparse and short, modified setae rounded or pointed apically. General color testaceous; conspicuous pattern elements lacking, but legs annulated.

Macropterous form: Head moderately elongate, strongly compressed dorsoventrally, anteocular and postocular regions of about equal size. Postocular region with sides subparallel or slightly converging posteriorly, abruptly constricted before neck. Clypeus somewhat salient, not spined. Labrum inconspicuous or in shape of more or less distinct projection. Eyes very small, almost circular in outline; interocular furrow not surpassing level of posterior border of eyes. Rostrum virtually straight, its segments slender; first segment not attaining level of anterior border of eyes, second slightly shorter than, third about as long as, first. Antennae inserted much before center of anteocular portion, but at a certain distance from apex of head.

Pronotum completely covering mesonotum. Anterior portion of prothorax subcylindrical, slightly narrowed toward middle, separated from hind lobe by a distinct sulcus; hind lobe of pronotum slightly shorter than fore lobe, virtually parallel-sided.

Forelegs delicate. Femora parallel-sided, spined portion covering slightly more than apical half of article. Posteroventral series beginning with very long, spiniferous process, followed by several shorter intermixed with very numerous very small ones. Anteroventral series interrupted at base, composed of medium-sized and small processes. Tibia one-third as long as femur, its ventral surface with one row of small, strongly sclerotized denticles. Fore tarsus about half as long as tibia, not segmented, strongly sclerotized, virtually bare above and at sides, ventrally with one or

two irregular rows of deflexed spiniform setae, which are short at base and slender and elongate on apical portion of article. Claws from slightly to considerably unequal in size, their under surface with medially incised, low lamella. Mid and hind legs slender, hind femora barely surpassing apex of abdomen. Tarsi of mid and hind legs slender, basal segment longest, second shortest. Claws very slender, delicately curved, rather strongly bent beyond base, basal third on under surface with a conspicuous triangular projection, apical two-thirds with very low lamella.

Forewings not extending much beyond center of abdomen; discal and subbasal cells present, latter not subdivided, at least four times as long as distance between base of discal cell and insertion of Pcu on cell as measured along Cu. Pterostigma approaching wing tip. Hind wings as long as forewings. Hamus approaching Sc+R only gradually, not meeting it, fused to Cu on basal third of wing. R-m cross vein absent; M joining Cu much basad of level of caesura, fused to Cu for considerable distance. R+M and Cu not connected to each other, projecting beyond level of cross vein to wing border; R+M forked apically.

Abdomen with sides subparallel; keeled below on most segments. Genitalia of both sexes not elevated in relation to longitudinal axis of abdomen.

Male: Seventh tergite very narrow, surpassing apex of pygophore. Eighth sternite large, fully exposed, emarginated at center behind. Pygophore relatively small, its anterior bridge very short, its posterior border prolonged below into very large, posterosuperiorly directed, triangular process. Parameres relatively short, slightly curved, their inner surface apically with brush of short, strong setae in addition to usual bristles. Phallus very small, occupying only small part of pygophore. Articulatory apparatus narrow. Phallobase very slender, only weakly sclerotized, cylindrical, somewhat pointed apically, its opening posteroventral. Endosoma simply tubular.

Female: Eighth tergite subhorizontal, longer than wide, its apex narrowly or broadly emarginate, its lateral portion bent downward, completely covering genitalia laterally. Ninth tergite extremely small, subvertical, barely visible through posterior emargination of eighth tergite. Gonocoxites and gonapophyses separated, exposed portions of former much longer than wide. Syngonapophysis deeply cleft apically.

Micropterous form: General characters like those of winged form. Fore tarsi not segmented, pseudo-segmented, or two-segmented, in last case apical shorter than basal segment. Remaining characters of fore, mid, and hind legs like those of macropterous form. Thorax slender and elongate. Pronotum subcylindrical, very slightly widened at anterior third; hind lobe short but distinct, not covering mesonotum, separated from fore lobe by distinct furrow. Mesonotum two-thirds as long as pronotum, metanotum shorter than or almost as long as mesonotum, both with minute wing pads. Abdomen and genitalia like those of macropterous form.

TYPE SPECIES: *Jamesa uelensis* Villiers (by subsequent designation, Villiers, 1949a).

DISTRIBUTION: Ethiopian Region.

OBSERVATIONS: Villiers (1948) designated *James zambeziana* as the type species, but failed to describe it until later (Villiers, 1949a), when he designated *Jamesa uelensis*, described in 1948, as the type species.

The genus ranges in a wide belt from west to east Africa, occupying the zone of the savannas (Villiers, 1948).

It has been found necessary to include in *Jamesa* species with one-segmented and with two-segmented fore tarsi. The common possession of such unique characters as the specialized structure of the genitalia in both sexes and the shape of the claws on the mid and hind legs, combined with the absence of any character that might serve to separate the groups mentioned, makes it impossible to place the respective species in different genera or even subgenera. The existence of specimens with fore tarsi on which segmentation is simulated is especially significant in this connection.

Jamesa is possibly related to *Metapterus*, from which it can be distinguished by the very large subbasal cell of its forewings, the specialized claws of the mid and hind legs, and chiefly by the genitalia. The pygophore and phallus of the males of the two genera are completely different in structure, and the eighth tergite of the female of *Metapterus* does not cover the gonocoxites laterally, as it does in *Jamesa*. The species of *Jamesa* with

two-segmented fore tarsi might be mistaken for those of *Ischnobaenella* or *Pseudobargylia*, but also in this case the claws of the mid and hind legs and the structure of the male and female genitalia provide sufficient differential characters.

As already mentioned by Villiers (1949a), the species of *Jamesa* seem to be extremely close to one another and are not easy to distinguish. The following key is adapted from Villiers.

KEY TO THE SPECIES OF *Jamesa*

1. Macropterous 2
   Micropterous. 8
2. Cross vein forming base of discal cell as long as distance between base of discal cell and insertion of Pcu cross vein on discal cell as measured along Cu 3
   Cross vein forming base of discal cell shorter than distance between base of discal cell and insertion of Pcu cross vein on cell as measured along Cu (fig. 157B) 5
3. Apical portion of M at apex of discal cell subparallel to apical portion of Cu . . *overlaeti*
   Apical portion of M forming distinct angle with apical portion of Cu. 4
4. Sides of postocular region of head slightly converging in dorsal view; median portion of hind border of pronotum broadly rounded though not very salient, almost as wide as lateral portions . . . . . *uelensis*
   Sides of postocular region of head parallel in dorsal view; median portion of hind border of pronotum very small, much narrower than lateral lobes . . . . . *zambeziana*
5. Distance between base of discal cell and insertion of Pcu cross vein on cell twice as large as cross vein forming base of discal cell (fig. 157B) . . . . . *carvalhoi*
   Distance between base of discal cell and insertion of Pcu cross vein on cell less than twice as large as cross vein forming base of discal cell 6
6. Distance mentioned one and one-half times as long as cross vein forming base of discal cell 7
   Distance mentioned less than one and one-half times as long as cross vein forming base of discal cell . . . . . *chabanaudi*
7. Sides of postocular region of head parallel in dorsal view, faintly constricted about middle . . . . . *squamulosa*
   Sides of postocular region of head more strongly converging posteriorly . . . . . *schoutedeni*
8. Tarsi of forelegs not segmented (as shown in fig. 157F); seventh sternite of female covering only extreme base of gonocoxites (fig. 157V); extreme apex of projection of pygophore slightly upwardly curved in lateral view (as shown in fig. 157K) 9
   Tarsi of forelegs either clearly two-segmented (fig. 158K) or pseudo-segmented (fig. 158J) . . . . . *monapo*
9. Mid and hind femora stramineous, with a conspicuous, very wide, blackish, apical annulus (fig. 157S); apical incision of eighth tergite of female very narrow, sides of tergite strongly convergent posteriorly (fig. 157U) . . . . . *machadoi*
   Mid and hind femora flavous; apical incision of eighth tergite much wider, sides of tergite almost subparallel behind . . . . . *aptera*

Jamesa aptera Villiers

Jamesa aptera VILLIERS, 1961, p. 54, figs. 31–35.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Female, Musée Royal de l'Afrique Centrale.

Jamesa carvalhoi, new species

Figure 157A–O

DESCRIPTION: Macropterous male: Length, 21.5 mm.; head, 1.5; thorax, 7; abdomen, 13 mm.

General color castaneous, mottled with stramineous; hind lobe of pronotum with broad, stramineous stripe along middle. Forewings grayish brown, faintly mottled with darker as shown in figure 157B. Head testaceous ventrally; projection of labrum fuscous, shining; rostrum flavescent, with longitudinal fuscous stripes. Antenna testaceous, first segment becoming darker toward apex. Forelegs light castaneous, processes of femora, the tibiae, and basal two-thirds of tarsus all flavescent. Mid and hind legs castaneous, femora darkened toward apex but not annulated; tibiae lighter-colored, with a faint, dark, narrow annulus subbasally. Surface of body dull, head and fore lobe of pronotum delicately granulate, hind lobe of pronotum delicately granulate-rugose, abdomen coarsely striate longitudinally.

Shape of head and rostrum as shown in figure 157A, D. Sides of postocular region slightly but distinctly converging posteriorly in dorsal view. Labrum transformed into distinct, downwardly bent, cylindrical projec-

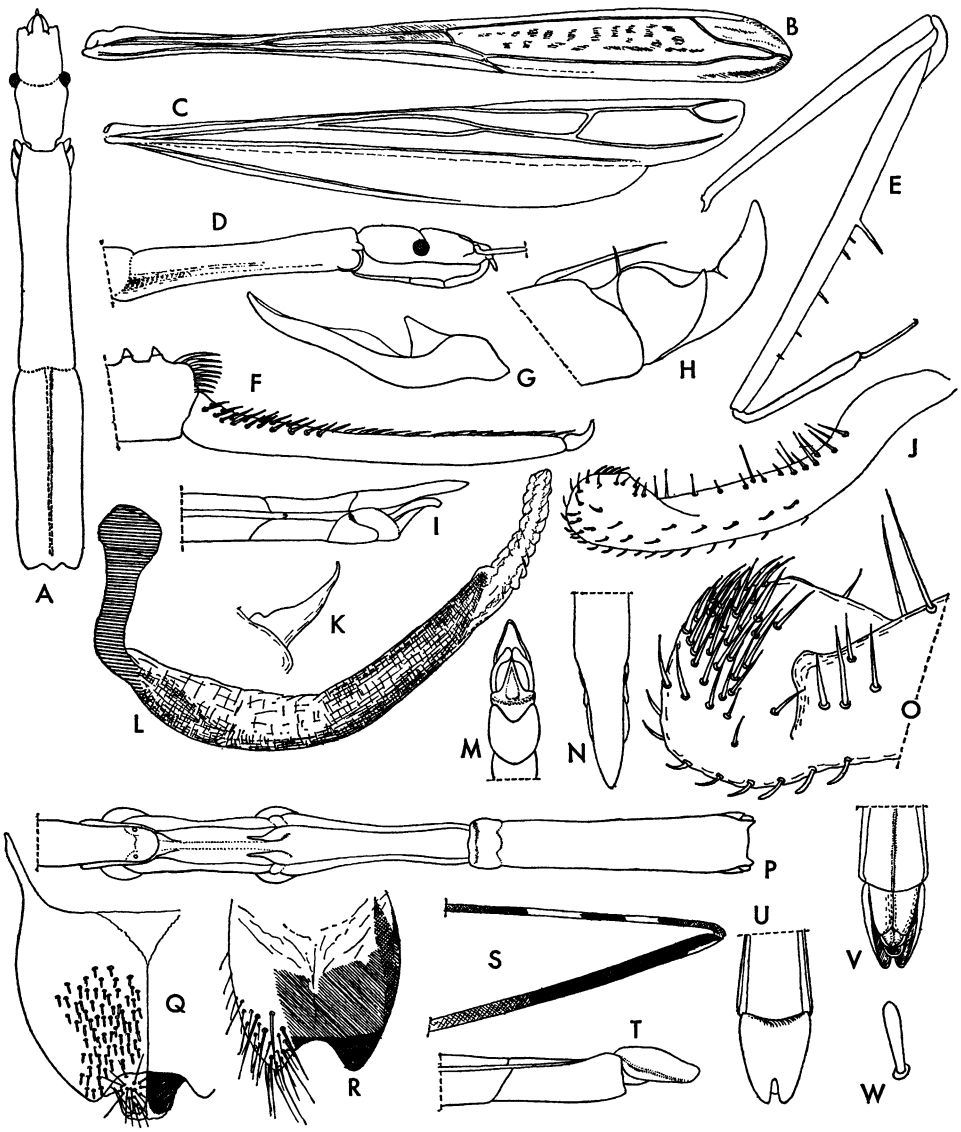


FIG. 157. A–O. *Jamesa carvalhoi*, male. A. Head and prothorax, seen from above. B. Forewing, with color pattern. C. Hind wing. D. Anterior portion of body, lateral view. E. Foreleg. F. Apex of fore tibia with tarsus. G. Claw of hind leg. H. Apex of fore tarsus with claws. I. Distal portion of abdomen of male, lateral aspect. J. Paramere. K. Posterior projection of pygophore, lateral view. L. Phallus, lateral view; endosoma slightly everted. M. Genital region, inferoposterior view. N. Seventh tergite, seen from above. O. Apex of paramere, high magnification. P–W. *Jamesa machadoi*, female. P. Thorax and base of abdomen, dorsal view. Q. Gonocoxite with gonapophyses; pigmentation shown on left gonapophysis. R. Syngonapophysis. S. Apex of femur and base of tibia of mid leg, with color pattern. T. Distal portion of abdomen of female, lateral view. U. Apex of abdomen, seen from above. V. Genital segments, ventral aspect. W. Seta of hind femur.

tion. Length of first antennal segment, 9 mm.; relative length of segments, 1/0.65/-0.025/0.27.

Shape of pronotum as shown in figure 157A, D; lateral region of fore lobe distinctly carinate-sulcate on posterior half; hind lobe widest on anterior longitudinal carina along middle.

Forelegs as given in generic description and shown in figure 157E. Coxa four-fifths of length of pronotum. Spiniferous processes of femur as given in generic description (only larger processes shown in illustration); posteroventral series, in addition to large basal process, with four or five medium-sized, and 25 small, processes, apically transformed into short denticles; anteroventral series composed of about four medium-sized, and 20 very small, processes. Tibiae as given in generic description, with about 20 denticles. Tarsus half as long as tibia, not segmented (fig. 157F); claws very unequal in size (fig. 157H). Shape of claws of mid and hind legs as shown in figure 157G.

Forewings reaching to slightly beyond middle of abdomen, their venation as shown in figure 157B. Distance between base of discal cell and insertion of Pcu cross vein on cell twice as large as cross vein forming base of discal cell. Hind wings as shown in figure 157C.

Abdomen virtually parallel-sided, slightly widened at about middle. Last tergite very slender, considerably surpassing apex of pygophore (fig. 157I). Projection of pygophore inserted above a carina limiting lower posterior border, rather strongly inclined, broadly triangular when seen from behind and below (fig. 157M), its point slightly curved upward in lateral aspect (fig. 157K). Parameres only weakly curved (fig. 157J), somewhat widened apically, distal group of setae as shown in figure 157 O. Phallus as given in generic description and shown in figure 157L.

MATERIAL EXAMINED: Angola: Lunda: Dundo, September, 1953, light trap [Ed. Luna de Carvalho; British Museum (Natural History)], one male holotype.

OBSERVATIONS: This species, named for its collector, is characterized by its combination of coloring and morphological characters.

Jamesa chabanaudi Villiers

Jamesa chabanaudi VILLIERS, 1948, p. 462, figs. 820, 904, 906–909, 912.

DISTRIBUTION: Guinea.

TYPE: Male, Muséum National d'Histoire Naturelle.

Jamesa machadoi, new species

Figure 157P–W

DESCRIPTION: Micropterous. Length of male, 22; of female, 24 mm.; male: head, 1.5; pronotum, 3; mesonotum, 2; metanotum, 1; abdomen, 14.5 mm.

General color castaneous to piceous, dorsum of head, entire thorax, and base of abdomen all lighter brown to flavescent; wing pads and clypeus whitish. Ventral surface of head, entire rostrum and antennae testaceous; apex of first segment of antennae darkened, and apex of second more strongly so, third and fourth entirely piceous. Abdomen piceous, sternites with a few indistinct light patches, connexivum banded with stramineous. Setiferous tubercles of body surface conspicuously stramineous. Forelegs ochraceous; coxae and femora piceous above and on inner surface. Processes of femora whitish. Tibiae stramineous, with one large apical annulus and one narrow submedian brownish annulus. Tarsus flavescent, extreme apex darkened. Mid and hind coxae black, contrasting with brown thorax; trochantera stramineous; femora stramineous, becoming slightly darker distally, apex with a wide, dark annulus, almost black on second, somewhat lighter on third pair (fig. 157S). Tibiae whitish at base, stramineous on rest of extension, extreme apex piceous; tibiae of second pair (fig. 157S) with one faint basal annulus brownish, one subbasal piceous, followed by another brownish one; hind tibiae with piceous annulus only. Tarsi piceous.

Shape of head and rostrum like that of *carvalhoi*. Length of first segment of antennae (female allotype), 10 mm.; relative length of segments, 1/0.7/0.02/0.25.

Thorax as shown in figure 157P; wing pads rather elongate, sharply pointed apically; proportions of nota as above. Posterior portion of prothorax shallowly but distinctly impressed longitudinally at sides before hind lobe; metanotum carinate along middle.

Forelegs as described for *carvalhoi*; coxae

rather conspicuously thickened on apical half, slightly longer than pronotum. Tarsi of forelegs not segmented, claws very unequal in size.

Abdomen slender, parallel-sided, its surface delicately rugose longitudinally and beset with rather widely spaced setiferous tubercles.

Male: Genital region very similar to that of *carvalhoi*; surface of pygophore smooth, contrasting with tuberculate sternites. Parameres like those of *carvalhoi*, setae somewhat more numerous.

Female: Genital region as shown in figure 157T–V. Sides of eighth tergite rather strongly converging posteriorly, posterior incision narrow. Seventh sternite covering only extreme base of gonocoxites, its posterior border rounded. Gonocoxites with modified setae on most of surface (fig. 157Q); shape, pigmentation, and chaetotaxy of syngonapophysis as shown in figure 157R.

MATERIAL EXAMINED: Angola: Lunda: Alto Chicapa, "chutes du Cuango Muquè," July 16, 1954 [A. de Barros Machado; British Museum (Natural History)], one male holotype, one female allotype.

OBSERVATIONS: This new species, named for its collector, differs from the remaining micropterous species of the genus as stated in the key. It does not seem to represent the micropterous form of any of the described winged species.

Jamesa monapo, new species

Figure 158A–Z, AA–DD

DESCRIPTION: Micropterous. Length of male, 26; of female, 26.5 mm.; male: head, 15; pronotum, 3; mesonotum, 2; metanotum, 2; abdomen, 17.5 mm.

General color castaneous, dorsum of head somewhat lighter brown; clypeus, ventral surface of head, and entire rostrum all stramineous. Antennae light brown; first segment darkened toward apex, extreme apex with very narrow, whitish annulus; third and fourth segments piceous. Thorax of general body color; collar, anterior acetabula, spots on posterior lobe of pronotum, and wing pads all stramineous. Abdomen heavily mottled with stramineous and piceous; setiferous tubercles mostly stramineous. Pygophore of male uniformly fuscous, its posterior border and process flavescent. Forelegs rather uniformly light castaneous; coxae apically, femora ventrally, tibia at base, middle, and apex, and tarsi apically, all faintly darkened. Mid and hind legs rather dark castaneous, apex of femora and base of tibiae almost piceous, and with two or three narrow, flavescent annuli. Tarsi piceous.

Shape of head and rostrum as shown in figure 158A–C. Labrum not distinctly projecting. Sides of postocular region of head very feebly converging posteriorly in dorsal view. Length of first segment of antennae (female allotype), 11.5 mm.; relative length of segments, 1/0.85/0.015/0.22.

Thorax as shown in figure 158A, N. Mesonotum about two-thirds as long as pronotum, metanotum almost as long as mesonotum. Posterior portion of prothorax laterally before hind lobe distinctly carinate-sulcate longitudinally. Mesonotum somewhat elevated on disc behind; metanotum with very feeble, median, longitudinal carina. Anterior wing pads slender, elongate, posterior ones much shorter.

Forelegs as given in generic description and shown in figure 158D–F, I, K, M. Coxa thickened on apical half, slightly longer than pronotum; processes of femur slightly more numerous than in *carvalhoi*. Tarsi distinctly two-segmented (fig. 158K); claws slightly unequal in size (fig. 158I). Tarsi and claws of hind legs as is shown in figure 158G, H, L.

General characters of abdomen as described above for *machadoi*.

Male: Genital region as shown in figure 158O–R. Surface of pygophore smooth, contrasting with tuberculate sternites, its posterior projection triangular basally, abruptly narrowed on apical third, its apex curved strongly backward. Parameres (fig. 158U) almost straight, rather wide on basal third, gradually narrowed toward apex, their distal group of setae as shown in figure 158V. Phallus as shown in figure 158S, T.

Female: Genital region as shown in figure 158W–Z. Eighth tergite distinctly elevated anteriorly on disc, its apical cleft relatively wide. Seventh sternite strongly projecting posteriorly, almost completely covering gonocoxites, truncate apically. Gonocoxites with modified setae on reduced apical area only (fig. 158CC). Shape, pigmentation, and chae-

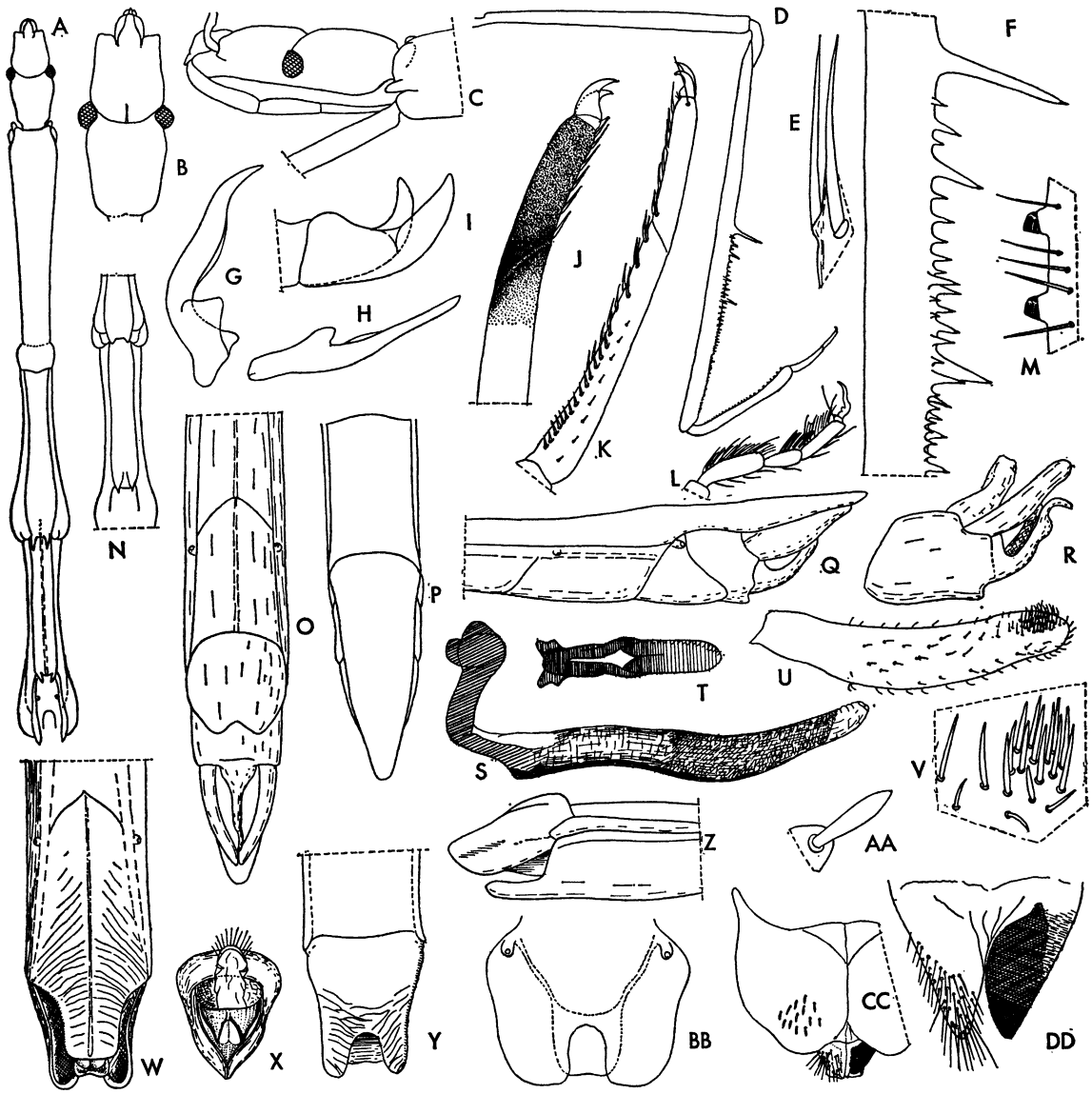


FIG. 158. *Jamesa monapo*. A. Anterior portion of body, dorsal view. B. Head, seen from above. C. Head, lateral aspect. D. Foreleg. E. Spines of under surface of fore tarsus. F. Base of series of fore femur. G, H. Claws of hind leg, different views. I. Claws of foreleg. J. Apical portion of fore tarsus with claws, female from Tanganyika. K. Fore tarsus, typical specimen. L. Posterior tarsus. M. Detail of under surface of fore tibia. N. Posterior portion of mesothorax and entire metathorax, dorsal view, female from Tanganyika. O. Genital region of male, ventral aspect. P. Apex of abdomen of male, dorsal view. Q. Distal portion of abdomen of male, lateral aspect. R. Pygophore with paramere and proctiger, side view. S. Phallus, lateral aspect. T. Articulatory apparatus. U. Paramere. V. Spinelike setae of apex of paramere. W. Apical portion of abdomen of female, ventral aspect. X. Genital region of female, with proctiger, seen from behind. Y. Apex of abdomen of female, dorsal view. Z. Apex of abdomen of female, lateral aspect. AA. Seta of gonocoxite. BB. Eighth and ninth tergites of female, as seen on slide mount; setae not shown. CC. Gonocoxite with gonapophyses; pigmentation shown for right gonopophysis. DD. Syngonapophysis.

totaxy of syngonapophysis as shown in figure 158DD.

MATERIAL EXAMINED: Mozambique: Monapo, September 15, 1918, under bark [G. D. H. Carpenter; British Museum (Natural History)], one male holotype, one female allotype, one female paratype.

OBSERVATIONS: The two-segmented fore tarsus alone is sufficient for distinguishing this species from all the others. The peculiar shape of the projection of the male pygophore, and the median projection of the seventh sternite of the female, seem also to be restricted to the present species.

Two additional females are at hand which are placed with certain doubts under *monapo*. They differ from those described above in being somewhat smaller (23–25 mm.) and in having very short wing pads on the mesonotum (fig. 158N) and, chiefly, in the pseudosegmented fore tarsus (fig. 158J), with the line of suture between the first and second segments indicated only by a somewhat incomplete, light-colored line in the dark pigment. At the present time, it is not possible to reach a conclusion as to the taxonomic status of these two specimens. Their extraordinary interest for the systematics of the whole group is mentioned in the generic description.

MATERIAL EXAMINED: *Mozambique:* Monapo, September 15, 1918, under bark [G. D. H. Carpenter; British Museum (Natural History)], one female. *Tanganyika:* Massassi, June 15–23, 1936, 460 meters (Zerny; Naturhistorisches Museum, Vienna), one female.

Jamesa overlaeti Villiers

Jamesa overlaeti VILLIERS, 1949a, p. 362, figs. 264, 265.

The original description, based on the male only, was later supplemented (Villiers, 1961) by that of the female.

DISTRIBUTION: Congo (Léopoldville); Angola.

TYPE: Male, Musée Royal de l'Afrique Centrale.

Jamesa schoutedeni Villiers

Jamesa schoutedeni VILLIERS, 1949a, p. 364, fig. 268.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Male, Musée Royal de l'Afrique Centrale.

Jamesa squamulosa Villiers

Jamesa squamulosa VILLIERS, 1948, p. 462, figs. 905, 916.

DISTRIBUTION: Central African Republic; Congo (Léopoldville).

TYPE: Male, Muséum National d'Histoire Naturelle.

Jamesa uelensis Villiers

Jamesa uelensis VILLIERS, 1948, p. 461, figs. 903, 910, 911, 913–915.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Female, Musée Royal de l'Afrique Centrale.

Jamesa zambeziana Villiers

Jamesa zambeziana VILLIERS, 1949a, p. 361, figs. 260–263.

DISTRIBUTION: Mozambique.

TYPE: Male, Musée Royal de l'Afrique Centrale.

LEAYLIA, NEW GENUS

DESCRIPTION: Apterous. Medium-sized species (12–13 mm.).

Body surface delicately reticulate-tuberculate. Setae short and sparse. General color piceous, with yellowish pattern elements.

Head with anteocular region longer than postocular, latter with sides undulate, slightly but regularly converging posteriorly in dorsal view. Clypeus without spine, labrum transformed into a downwardly bent flap. Rostrum straight, segments subcylindrical; first segment attaining level of anterior border of eyes; second only about half as long as first, slightly swollen; third somewhat shorter than first. Eyes very small, remote from level of dorsal and ventral surfaces of head. Interocular furrow originating at level of center of eyes, strongly curved backward, its posterior extremity situated behind level of posterior border of eyes. Antenna inserted somewhat before center of anteocular region.

Prothorax subcylindrical, slightly narrowed posteriorly, with 1+1 short, sublateral projections before short, but distinct, hind lobe of pronotum. Mesonotum almost twice as long as wide, metanotum shorter than mesonotum, shorter than wide, combined about as long as pronotum.

Forelegs stout. Fore femur with two series of elongate processes bearing short, apical spines. Posteroventral series beginning almost at base of article, first process longest, its length surpassing that of diameter of fe-

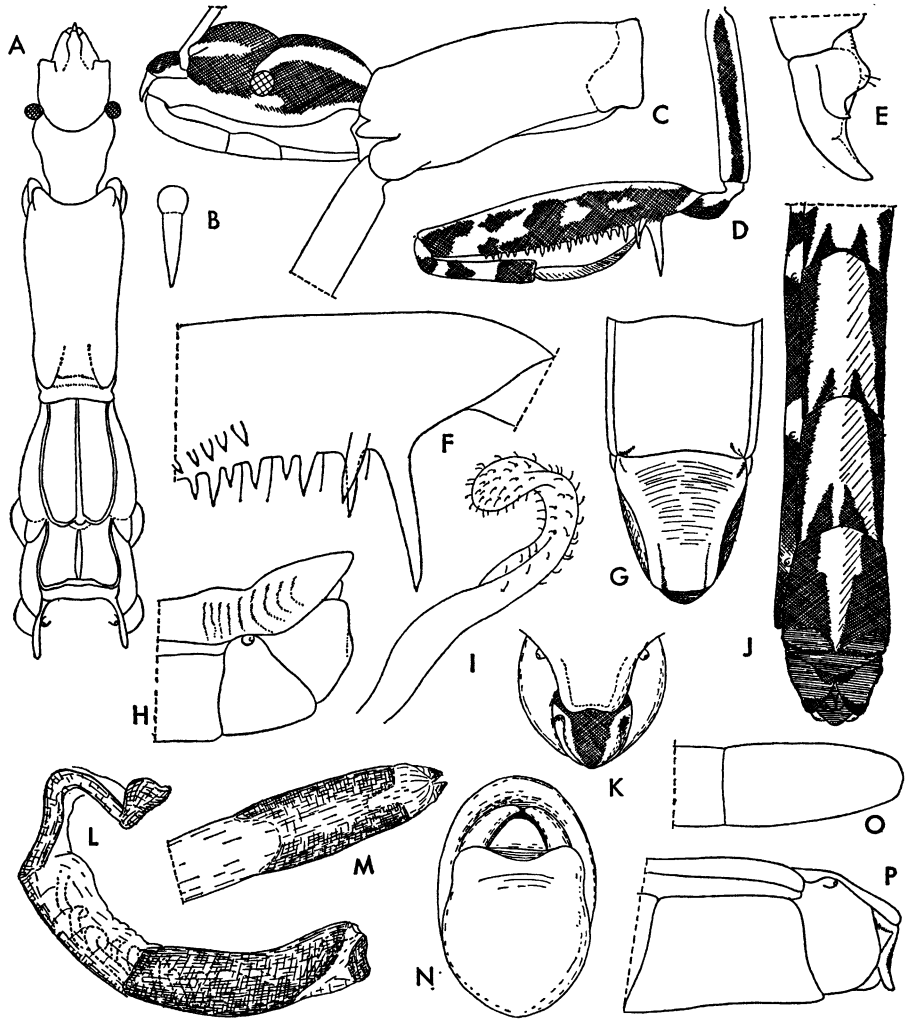


FIG. 159. *Leaylia norfolkiana*. A. Head and thorax, seen from above. B. Labrum. C. Head and prothorax, lateral view; head with color pattern. D. Foreleg, with color pattern. E. Claws of foreleg. F. Base of fore femur. G. Apical segments of abdomen of female, seen from above. H. Distal portion of abdomen of male, lateral view. I. Paramere. J. Apical half of abdomen of female, seen from below, with color pattern. K. Genital region of female, seen from behind. L. Phallus, lateral view. M. Phallosoma, dorsal aspect. N. Pygophore, seen from behind. O. Apex of abdomen of male, dorsal view. P. Apex of abdomen of female, lateral aspect.

mur; anteroventral series beginning almost at level of posteroventral series, widely interrupted at base. Fore tibia less than half as long as femur, its under surface with strongly sclerotized, simple denticles. Tarsus almost as long as tibia, not segmented, curved, strongly sclerotized, bare above and at sides, its under surface with almost knifelike, adpressed, spiniform setae. Two claws, outer one large, with medially incised ventral lamella, inner one much smaller, simple.

Abdomen parallel-sided, not very slender, longer than head and thorax combined.

Male: Seventh tergite completely covering pygophore from above. Eighth sternite large, fully exposed. Posterosuperior border of pygophore with broad, laminate process, somewhat recessed from hind border. Parameres curved apically, with short setae. Phallus symmetrical. Basal plates relatively long and slender; basal plate struts not extended. Phallosoma elongate, subcylindrical, membranous, sclerotized ventrally on basal, entirely on apical, half, with exception of extreme apex; opening posteroventrally directed. Endosoma tubular, spiraled when at rest.

Female: Eighth tergite large, subhorizontal, broadly truncate apically; ninth vertical, not visible from above but fully exposed in posterior view.

TYPE SPECIES: *Bargylia norfolkiana* Wygodzinsky.

DISTRIBUTION: Norfolk Island.

OBSERVATIONS: The type species was originally described under *Bargylia*, and, though superficially similar to the less-modified species of that genus, it differs from *Bargylia* by such important characters as the straight rostrum, the extremely short metanotum, and mainly by the phallus, clearly of a very different type, which lacks the elongate struts found in *Bargylia*. At this time, the real affinities of *Leaylia* cannot be decided upon. The Austral Islands *Tubuataita* is possibly related to *Leaylia*, but, being more specialized than the latter, furnishes no information on the origin of the assemblage.

Leaylia norfolkiana (Wygodzinsky), new combination

Figure 159A–P

Bargylia norfolkiana WYGODZINSKY, 1956, p. 199, figs. 23–27.

The available illustrations for the species are here reproduced.

DISTRIBUTION: Norfolk Island.

TYPE: Male, Museum Zoologicum Universitatis.

LEPTINOSCHIDIUM, NEW GENUS

Ischnobaena AUCT. (part).

DESCRIPTION: Apterous. Slender, large to very large species (23–36 mm.).

Body surface dull; head and thorax smooth, abdomen with minute, irregularly branched, longitudinal carinae. Setae sparse and short; modified setae delicately pointed. Color uniformly dark or conspicuously bicolorous.

Head subfusiform, anteocular and postocular regions subequal in length, anteocular conspicuously elevated, postocular with sides undulate and convergent posteriorly but not conspicuously constricted at neck in dorsal view. Clypeus and labrum without projections. Eyes very small. Interocular furrow originating at or before level of center of eyes, extending backward to or beyond level of posterior border of eyes. Rostrum straight, slender; first segment elongate, attaining level of center of eyes; second segment very short, from one-third to one-half as long as first; third longer than second but shorter than first. Antennae inserted near apex of head.

Thorax long and slender. Prothorax subcylindrical, only slightly widened anteriorly; mesothorax and metathorax subequal in size, widened posteriorly, each only slightly shorter than prothorax.

Legs moderately long, very slender. Forelegs with femur parallel-sided; spined portion occupying about two-fifths of total length of article; details of arrangements of spiniferous processes like those in *Schidium*. Tibia about one-fourth as long as femur, its under surface with one series of strongly sclerotized, peglike denticles. Fore tarsus one-half or slightly more than one-half as long as tibia, slightly curved, not segmented, virtually bare above and at sides, under surface with one row of deflexed spiniform setae; claws slightly unequal in size, their under surface with medially incised lamella. Femora of hind legs

slightly surpassing apex of abdomen; tarsi and claws like those of *Schidium*.

Abdomen very slender, parallel-sided, keeled below on most segments. Genital segments of both sexes somewhat elevated in relation to longitudinal axis of abdomen.

Male: Seventh tergite elongate, tongue-shaped, rounded apically, not quite covering genitalia from above. Eighth sternite large, emarginated behind at center, longitudinally striate laterally. Pygophore slightly compressed laterally, its outline irregular in lateral view; posterosuperior border with a very long and slender, upwardly directed spiniform process concealed by parameres in lateral view and somewhat thickened apically. Parameres lamellate, strongly widened triangularly, their inner surface with numerous sensory spines and cones. Phallus large, symmetrical. Basal plates fused. Struts forming an elongate, shieldlike sclerite apically, not trifid along ventral surface of phallobase, with median distal projection bearing apically 1+1 groups of small denticles. Phallosoma largely membranous, ventrally at apex with 1+1 large, backwardly directed processes, its opening posterodorsally directed. Endosoma like that of *Schidium*.

Female: Eighth tergite subhorizontal, its sides converging posteriorly, posterolateral angles rounded, hind border emarginated. Ninth tergite small, visible from above, its central portion dorsally mostly with a more or less conspicuous projection situated within apical emargination of eighth tergite. Gonocoxites and gonapophyses distinctly separated. Syngonapophysis only faintly emarginated posteriorly.

TYPE SPECIES: *Ischnobaena preussi* Karsch.

ETYMOLOGY: *Leptos*, thin, and *Schidium*, a genus of the Emesinae.

DISTRIBUTION: Ethiopian Region.

OBSERVATIONS: The species included in the new genus are extremely similar to those of the Oriental genus *Ischnobaena* in shape and peculiar color patterns, but a detailed examination of the male genitalia shows that these genera are very different. One cannot have been derived from the other. As the female genitalia are also different, it is possible to separate the two genera on the basis of the externally visible characters of the genitalia in both sexes, but the different proportions of the rostral segments (figs. 160C, O; 153C) are equally useful for separating *Ischnobaena* from *Leptinoschidium*.

The true affinities of the new genus, as shown by the peculiar structure of the phallus, lie with *Schidium*, and especially with the group around *lemur*, in which many of the characters of *Leptinoschidium* are also found, though not in all species: the very slender body, the apterous condition, the very large apically subtriangular parameres of the male, the apically not trifid shield formed by struts, the rounded posterolateral angles of the eighth tergite of the female, and the short upper projection of the ninth situated within the emargination of the eighth. Most of the features enumerated are apomorphic and would indicate a closer relationship of *Leptinoschidium* to the group around *lemur* than to the remaining species of *Schidium*, but there are also some apomorphic characters in *Schidium marcidum* that connect this otherwise quite dissimilar species to the *lemur* group as well as to *Leptinoschidium*, i.e., the shape of the parameres and 1+1 groups of denticles on the median distal projection of the shield formed by fused struts. Not enough species of the *Schidium-Leptinoschidium* assemblage have been analyzed in detail, and, until the taxa involved can be grouped in agreement with their true phylogenetic relationships, the autapomorphic characters of the species here united under *Leptinoschidium*, such as the proportions of the rostral segments and the peculiar color pattern not found in *Schidium*, justify a separate genus.

In addition to the two new species described below, at least two more are now before me. It seems obvious that the genus is composed of quite a large number of closely related and apparently highly endemic species differing mainly by color characters, which are not invariably very obvious, and details of the male and female genitalia.

KEY TO THE SPECIES OF *Leptinoschidium*

1. Main color of abdomen yellowish or reddish, apex black (figs. 160A; 161B) 2
   Main color of abdomen black, in some cases reddish at middle 5
2. First article of rostrum more than twice as long as second (figs. 160C; 161A) 3
   First article of rostrum twice as long as second . . . . . *ejuncidum*

3. General color reddish, apex of posterior femora dark; apex of parameres of male moderately salient (fig. 161C, I); eighth tergite of female about as long as wide (fig. 161P) . . *preussi*
   General color yellowish, apex of posterior femora white; apex of parameres of male elongately salient (fig. 160D, G); eighth tergite of female distinctly shorter than wide (fig. 160I) 4
4. Length, 23 mm.; first segment of rostrum three times as long as second; femur of mid legs with a preapical white annulus; pygophore in lateral view as shown in figure 160N, apical appendages of phallobase about eight times as long as wide subapically in lateral aspect; ninth tergite of female subrectangular, somewhat widened below, excavate on disc and with a distinct projection above (fig. 160M) and approximately as shown in fig. 161T) . . . . . *congoanum*
   Length, more than 30 mm.; first segment of rostrum two and one-half times as long as second (fig. 160C); white annulus of femur of mid legs apical; lateral view of pygophore as shown in figure 160E, apical appendages of phallobase only about four times as long as wide before apex in lateral view (fig. 160H); ninth tergite of female elliptical, its surface convex, without projection above (fig. 160I, K) . . . . . *acicularis*
5. All thoracic nota entirely black; size, 30 mm. or less 6
   Pronotum mainly light-colored; size, more than 30 mm . . . . . *madecassum*
6. Light-colored portions of rostrum and forelegs orange or brick red; apical emargination of eight tergite of female as deep as wide at base . . . . . *camerunense*
   Light-colored portions of rostrum and forelegs stramineous; apical emargination of eighth tergite of female shallow, not so deep as wide at base (fig. 160FF) . . . . . *villiersi*

Leptinoschidium acicularis, new species

Figure 160A–K, P

DESCRIPTION: Length of male, 31.5; of female, 36 mm.; male: head, 1.7; pronotum, 4.2; mesonotum, 3.6; metanotum, 3.4; abdomen, 18.7 mm.

General color testaceous. Head and rostrum concolorous; antennae fuscous, first article somewhat lighter apically. Mesothorax posteriorly and metathorax completely piceous to black; abdomen darkened at base, seventh through ninth segments black in both sexes. Forelegs of general color, tibia with wide annulus at middle and tarsus on basal two-thirds stramineous. Coxa of mid and hind legs black; femora with white apical annulus, wider on posterior than on median femora; tibiae with wide basal white annulus, shortly interrupted on apical third on mid tibia.

Head and rostrum as shown in figure 160A–C; first segment of rostrum two and one-half times as long as second. Antennae bare in both sexes; length of first segment of male, 22 mm.; relative length of segments, 1/0.75/0.02/0.2.

Thoracic segments as shown in figure 160A, B; carinae of mesothorax and metathorax very faint.

Forelegs as given in generic description and as described and figured for *villiersi* (see below). Hind femora surpassing apex of abdomen by 3 mm.

Abdomen very slender (fig. 160B), narrowest at base, widened on apical half, about 20 times as long as wide before genital segments.

Male: Genitalia as shown in figure 160G–H. Parameres with their upper angle strongly projecting, distribution of sensory spines and cones as illustrated. Phallus much like that of *preussi* (see fig. 161J–M, O, Q, R; projections of phallobase shorter, somewhat bent at apex; endosoma much like that of *preussi*, different sclerites somewhat more elongate and less strongly sclerotized.

Female: Genital region as shown in figure 160I–K, P. Eighth tergite two-thirds as long as wide at base, sides converging posteriorly, posterior border almost straight across between posterolateral angles; disc faintly sculptured. Ninth tergite salient posteriorly, posteriorly rounded in dorsal, elliptical in posterior, view, its disc regularly convex, without projections.

MATERIAL EXAMINED: Cameroon: Efulen (H. L. Weber; Carnegie Museum), one male holotype, one female allotype; Efulen (J. A. Reis; the American Museum of Natural History), one female paratype.

OBSERVATIONS: This species approaches *congoanum*. The main differential characters are indicated in the key.

Leptinoschidium camerunense (Villiers), new combination

Ischnobaena camerunensis VILLIERS, 1956b, p. 591, fig. 3.

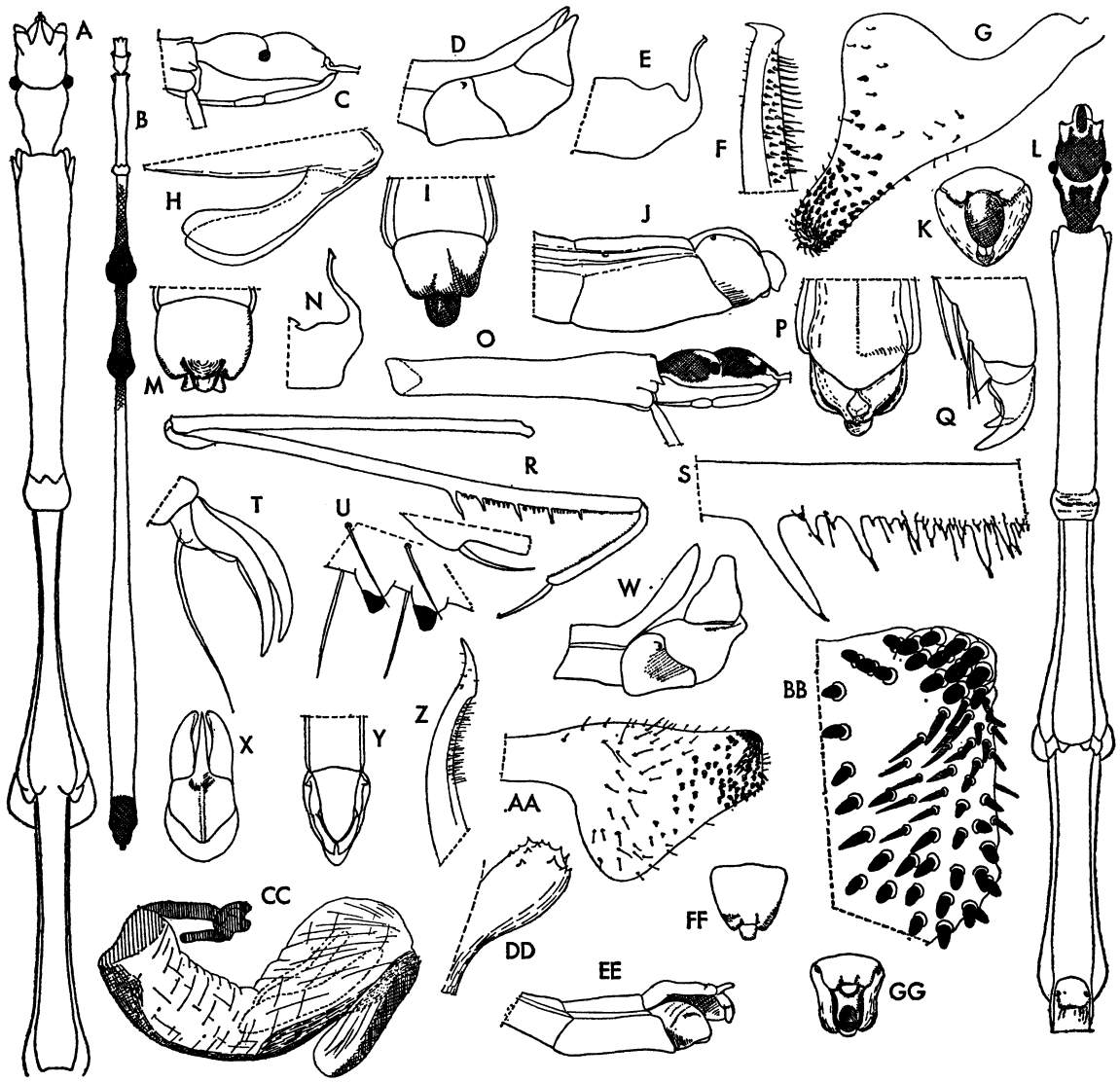


FIG. 160. A–K. *Leptinoschidium acicularis*. A. Head and thorax of female, dorsal view. B. Female, general aspect, with color pattern. C. Head, lateral view. D. Genital region of male, side view. E. Pygophore, lateral aspect. F. Apex of posterior portion of pygophore, high magnification. G. Paramere. H. Inferior processes of apical portion of phallosoma. I. Genital region of female, dorsal view. J. Apex of abdomen of female, lateral aspect. K. Genital region of female, seen from behind. L. *Leptinoschidium villiersi*, head and thorax, dorsal view; head with color pattern. M, N. *Leptinoschidium congoanum*. M. Genital region of female, dorsal aspect. N. Pygophore, lateral view. O. *Leptinoschidium villiersi*, head and prothorax, lateral aspect. P. *Leptinoschidium acicularis*, genital region of female, ventral aspect. Q–Z, AA–GG. *Leptinoschidium villiersi*. Q. Apex of fore tarsus with claws. R. Foreleg. S. Base of series of fore femur. T. Praetarsus and claws of hind leg. U. Spines of under side of fore tibia. V. Seta of hind femur. W. Genital region of male, side view. X. Genital region of male, seen from behind. Y. Apex of abdomen of male, seen from above. Z. Apex of process of pygophore, lateral aspect. AA. Paramere; extreme base not shown. BB. Distal portion of paramere, high magnification. CC. Phallus, lateral view. DD. Inferoposterior extremity of phallosoma, ventral view, high magnification. EE. Distal portion of abdomen of female, lateral view. FF. Apex of abdomen of female, dorsal view. GG. Genital region of female, seen from behind.

DISTRIBUTION: Cameroon.

TYPE: Female, Universitetets Zoologiske Museum.

Leptinoschidium congoanum (Villiers), new combination

Figure 160M, N

Ischnobaena congoana VILLIERS, 1948, p. 474, figs. 947–953.

For comparative purposes, figures of the male and female genitalia are here reproduced.

DISTRIBUTION: Congo (Brazzaville).

TYPE: Male, Muséum National d'Histoire Naturelle.

Leptinoschidium ejuncidum (Bergroth), new combination

Ischnobaena ejuncida BERGROTH, 1903a, p. 10.

As stressed by Villiers (1948, 1949a), *ejuncidum* differs from the remaining species by its more complex color pattern, but the available information on its morphology is not sufficient for our questioning the generic assignment of *ejuncidum*.

DISTRIBUTION: Ivory Coast.

TYPE: Museum Zoologicum Universitatis.

Leptinoschidium madecassum (Villiers), new combination

Ischnobaena madecassa VILLIERS, 1949a, p. 392, figs. 324, 337.

I have examined three females from Cameroon (Efulen, H. L. Weber; Lolodorf, A. J. Ford; all in Carnegie Museum) which agree quite well with the original description as to size, color, and general morphology, but the ninth tergite is smaller than that illustrated by Villiers (1949a). The latter fact, together with the distance that separates Cameroon from Madagascar, whence the species was described, makes the specific identity of the individuals mentioned doubtful.

DISTRIBUTION: Madagascar; Cameroon?.

TYPE: Female, Muséum National d'Histoire Naturelle.

Leptinoschidium preussi (Karsch), new combination

Figure 161A–Z

Ischnobaena preussi KARSCH, 1892, p. 136.

This is the type species of *Leptinoschidium;* its most important characters, especially those of the genitalia, are here illustrated.

DISTRIBUTION: Cameroon.

TYPE: Unknown.

Leptinoschidium villiersi, new species

Figure 160L, O, Q–Z, AA–GG

DESCRIPTION: Length of male, 23–24; of female, 24 mm.; male: head, 1.5; pronotum, 3.2; mesonotum, 2.7; metanotum, 2.6; abdomen, 14.5 mm.

General color piceous to black. Head above and at sides with more or less distinct testaceous pattern as shown in figure 160L, O; ventral surface stramineous (fig. 160O). First and second segments of rostrum stramineous, third dark. Antennae uniformly fuscous. Forelegs fuscous, apical half of femora piceous, larger spines stramineous. Fore tibia fuscous, with two incomplete whitish annuli, one small subbasal, the other one somewhat large, submedian. Fore tarsi whitish on basal fourth, remainder fuscous. Mid and hind legs uniformly fuscous.

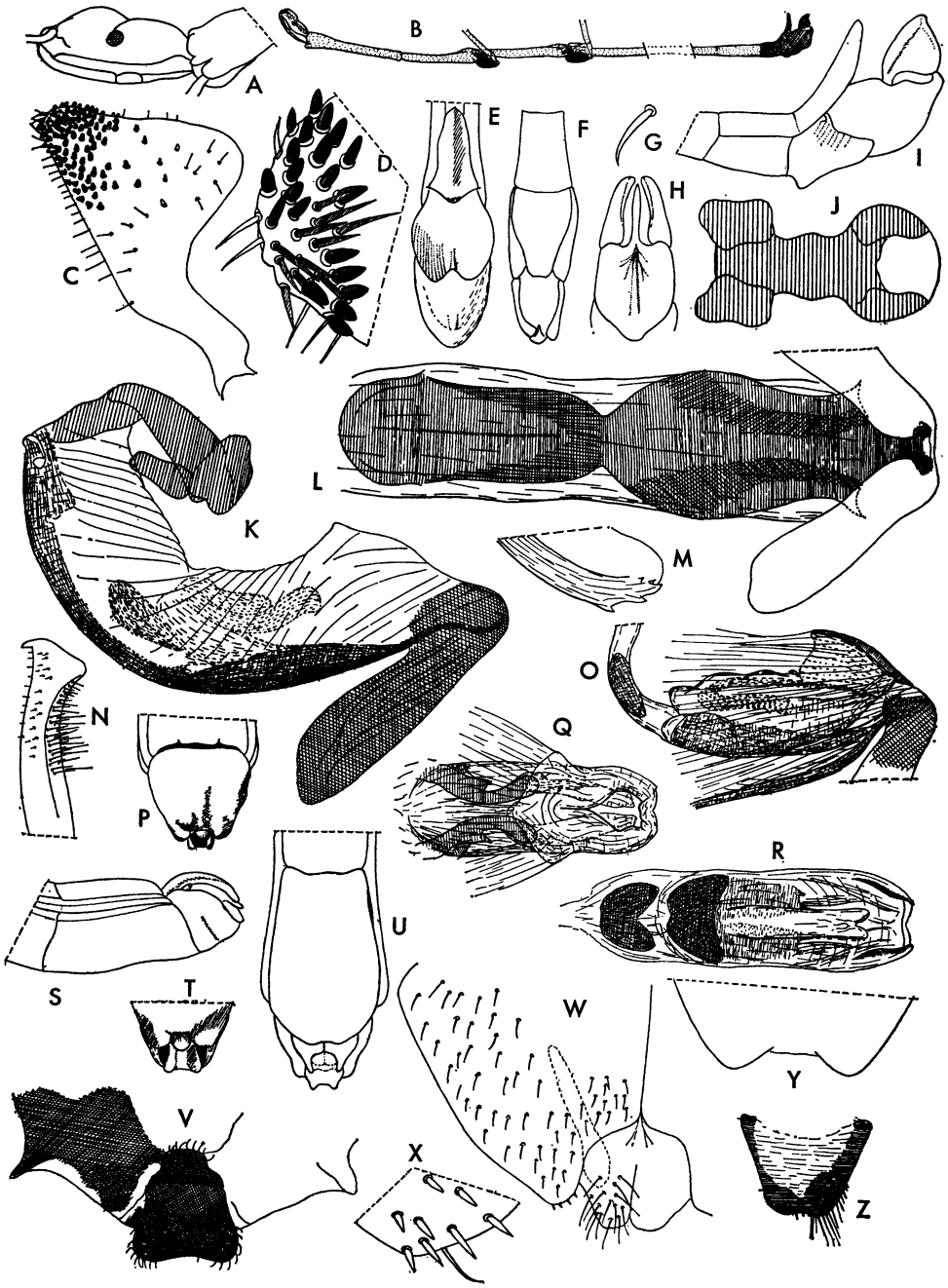
Head and rostrum as shown in figure 160L, O. Length of first segment of antennae (male holotype), 12.5 mm.; relative length of segments, 1/0.9/0.045/0.26.

Thorax as shown in figure 160L, O. Carina of mesonotum and metanotum not distinct.

Forelegs as shown in figure 160Q–S, U. Coxa slightly longer than prothorax. Ratio of spined to unspined section of femur, 1/1.35; posteroventral series composed of one large spiniferous process and three medium-sized, and about 25 small to very small, spiniferous processes; anteroventral series composed of three medium-sized and about 30 small to very small processes; basal process of posteroventral series twice as long as diameter of article. Fore tibia with one row of about 30 denticles (fig. 160U); fore tarsus with two subequal claws (fig. 160Q). Mid and hind legs without special characters, hind femora surpassing apex of abdomen by 2–3 mm.; modified setae of hind femur as shown in figure 160V; praetarsus of hind legs, in figure 160T.

Abdomen almost parallel-sided, slightly widened posteriorly, 20 times as long as wide before genital segments. Ventral surface keeled from base to seventh sternite.

Male: Genital region as shown in figure 160W–Z, ventral aspect similar to that of


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z

preussi (see fig. 161E). Upper angle of parameres truncate; their exact shape and chaetotaxy as shown in figure 160AA, BB. Phallus (fig. 160CC, DD) and endosoma similar to those of *preussi*.

Female: Genital region as shown in figure 160EE–GG. Eighth tergite slightly wider than long, emargination of hind border shallow. Ninth tergite elongate, with conspicuous projection above, forming right angle with main body of tergite; distinct depression before apex of tergite. Ventral aspect of genitalia like that in *preussi* (see fig. 161U).

MATERIAL EXAMINED: Cameroon: Sasse near Buea, Mt. Cameroon, February–March, 1952, 3500 feet (S. Tita; collection Usinger), one male holotype, one female allotype, one male paratype; (S. Tita; the American Museum of Natural History), one male paratype.

OBSERVATIONS: The new species, named for A. Villiers in recognition of his work on the Emesinae of Africa, seems close to *camerunensis*. It differs by color characters and by the structure of the female genital region as indicated in the key. The male of *camerunensis* has not been described, and additional differential characters may be found in this sex.

LIAGHINELLA, NEW GENUS

DESCRIPTION: Apterous male: Small species (8 mm.).

Body surface dull; head and thorax granulated. Setae sparse and short; modified setae elongate, pointed. Body almost uniformly dark, antennae and legs annulated with lighter.

Head short; anteocular portion slightly longer than postocular; anteocular with sides subparallel in dorsal view, postocular with sides strongly converging posteriorly, but not abruptly constricted at base. Eyes small; interocular furrow not extending to level of posterior border of eyes. Clypeus spined; labrum closely adhering to base of rostrum, not projecting. Rostrum almost straight; segments not swollen; first segment attaining center of anteocular region; second slightly shorter than first, third slightly longer than first and second combined. Antennae inserted near apex of head, much shorter than body.

Prothorax very short, subcylindrical, strongly convex above; hind lobe not distinct. Mesothorax and metathorax very short, both combined not quite so long as prothorax. Mesonotum and metanotum somewhat convex above, mesonotum more conspicuously so, both with a deep, median, longitudinal furrow.

Forelegs stout. Femur widened toward middle. Posteroventral series beginning at base of article with very long, spiniferous process, followed by numerous short and very short processes, transformed at apex of article into short denticles. Anteroventral series beginning somewhat distad of posteroventral series, not interrupted at base, consisting of short and very short spiniferous processes intermixed with setae inserted on small, wartlike bases. Fore tibia somewhat less than half as long as femur; ventrally with one series of short, hooklike denticles. Tarsus as long as tibia, not segmented, heavily sclerotized, almost bare above and at sides, ventral surface with two series of adpressed, knifelike setae. Claws unequal in size, lacking ventral, medially incised lamella. Mid and hind legs

---

FIG. 161 (OPPOSITE PAGE). *Leptinoschidium preussi*. A. Head and anterior portion of prothorax, lateral view. B. General aspect of male, side view, with color pattern; some abdominal segments omitted. C. Paramere. D. Apex of paramere, high magnification. E. Apical portion of abdomen of male, ventral aspect. F. Apical portion of abdomen of male, dorsal view. G. Stea of sternite. H. Pygophore, seen from behind. I. Genital region of male, side view. J. Articulatory apparatus. K. Phallus, lateral aspect. L. Phallosoma, ventral view; phallosoma appendages to the right. M. Inferoposterior extremity of phallosoma, lateral view, high magnification. N. Apex of process of pygophore, high magnification. O. Endosoma, lateral aspect, shown in opened phallosoma. P. Genital region of female, seen from above. Q. Endosoma, dorsal aspect. R. Endosoma, ventral view. S. Apex of abdomen of female, side view. T. Genital region of female, seen from behind. U. Distal region of abdomen of female, seen from below. V. Eighth and ninth tergites of female, as seen on slide mount. W. Gonocoxite with gonapophysis. X. Spiniform setae of upper surface of apical margin of gonocoxite. Y. Apex of ninth tergite. Z. Syngonapophysis.

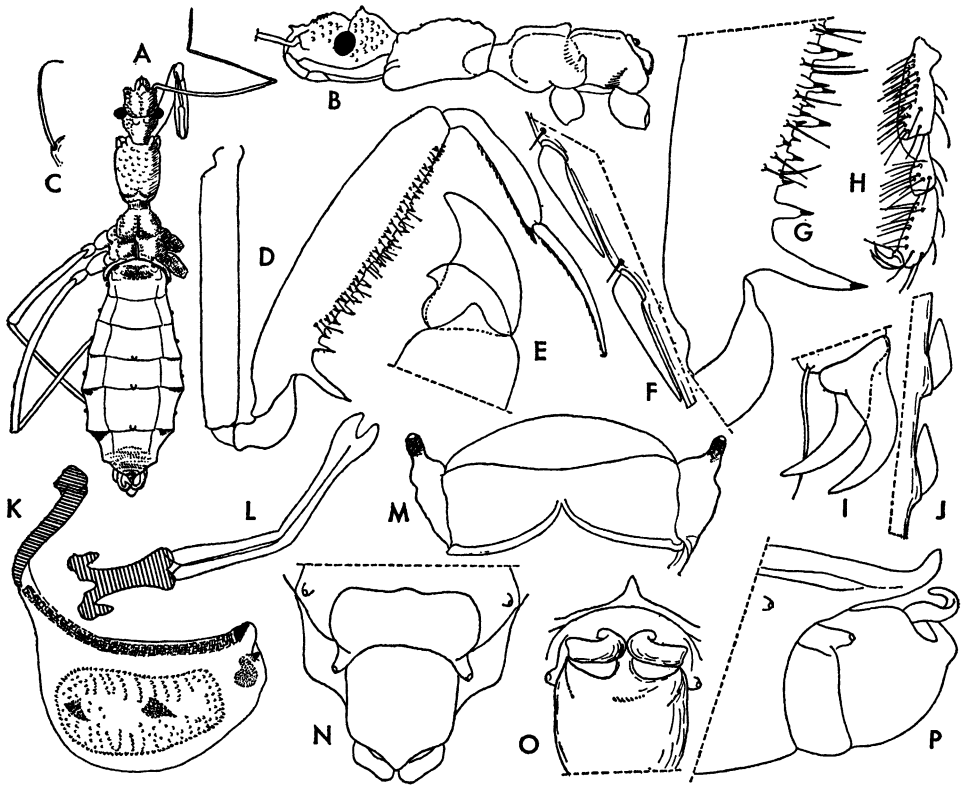


FIG. 162. *Liaghinella farri*, male. A. General aspect. B. Head and prothorax, lateral view. C. Seta of posterior femur. D. Foreleg. E. Claws of foreleg. F. Spines of under surface of fore tarsus. G. Base of fore femur. H. Hind tarsus. I. Claws of hind leg. J. Denticles of under surface of fore tibia. K. Phallus, lateral view. L. Articulatory apparatus with basal plate struts. M. Eighth sternite, as seen on slide mount; setae not shown. N. Genital region, ventral view. O. Genital region, seen from behind. P. Apex of abdomen, lateral view.

short and stout, hind femur not attaining apex of abdomen. First and third segments of mid and hind tarsi subequal in size, second much shorter; ventral setae of first segment slightly shorter and somewhat more numerous than those of other segments. Claws slender, curved, lacking ventral, medially incised lamella.

Abdomen short, broadly inserted on abdomen, widest at middle, carinate ventrally on most segments. Seventh tergite broadly triangular, shortly pointed apically, not covering genital region completely from above. Eighth sternite fully exposed; its spiracles pedunculate. Pygophore subsemicircular in lateral view, its posterosuperior process spiniform. Parameres curved apically. Phallus symmetrical. Basal plate struts accompanying dorsal surface of phallosoma, fused for most of their length, shortly separated only at apex. Phallobase without distinct sclerotizations. Endosoma wall covered with numerous, very small, regularly arranged spicules and a few small, paired chitinized processes.

TYPE SPECIES: *Liaghinella farri*, new species.

ETYMOLOGY: Anagram of *Ghilianella*, a genus of the Emesinae.

DISTRIBUTION: Jamaica.

OBSERVATIONS: *Liaghinella* is obviously related to *Ghilianella*, as shown by the structure of the forelegs. The very stout body with the extremely short thoracic nota, the insertion of the first process of the posteroventral

series at the base of the fore femur, the complete loss of the medially incised lamella on the under surface of the claws, and the relatively simple phallus are the most striking characters of *Liaghinella*.

Liaghinella farri, new species

Figure 162A–P

DESCRIPTION: Male: Length to apex of last tergite, 8.2 mm.; head, 1.3; thorax, 2.3; abdomen, 4.6 mm.

Head, thorax, and abdomen fuscous, head somewhat lighter above. Rostrum testaceous, first segment tinged with flavescent. Antennae fuscous, first segment lighter at base and with distinct, submedian, flavescent annulus. Legs castaneous. First pair with coxa, trochanter, and femur irregularly spotted with flavescent, more conspicuously so on inner surface; tibia with one distinct basal and one submedian flavescent annulus; tarsus luteous at base. Coxae and trochantera of mid and hind legs dark; femur of second pair with five, of third with three, narrow, equally spaced, luteous annuli, base and apex dark; tibiae mottled with flavescent on basal half.

Surface of head, thorax, and abdomen dull; head and thorax conspicuously tuberculate (fig. 162A, B). Appendages shining. Abdomen delicately rugose transversely. Pilosity sparse, short, golden; modified setae as shown in figure 162C.

Head and rostrum as given in generic description and shown in figure 162A, B; postocular region dorsally behind interocular furrow with 1+1 conspicuous tubercles. Antennae with only very short pilosity; first segment distinctly curved, its length, 2.3 mm.; relative length of segments, 1/0.8/0.09/0.25.

Thorax and legs as given in generic description and shown in figure 162A, B, D–J. Space between posteroventral and anteroventral series of fore femur with a few small, isolated, accessory, spiniferous processes. Hind femur distinctly curved.

Abdomen and genitalia as given in generic description and shown in figure 162K–P. Hind border of dorsal connexival segments slightly elevated. Posterior process of pygophore curved forward.

MATERIAL EXAMINED: Jamaica: Saint Thomas: Corn Russ Gap, northwest of Bath, November 23, 1951, 3000 feet (R. L. Hoffman; Institute of Jamaica), male holotype.

OBSERVATIONS: The new species is named for Dr. T. Farr, entomologist at the Institute of Jamaica, on the suggestion of Dr. J. Maldonado Capriles, who kindly transmitted this specimen to me for study.

METAPTERUS COSTA

Metapterus COSTA, 1863, p. 336.
Carambis STÅL, 1865, p. 163.
Mantisoma JAKOVLEV, 1874, p. 34.

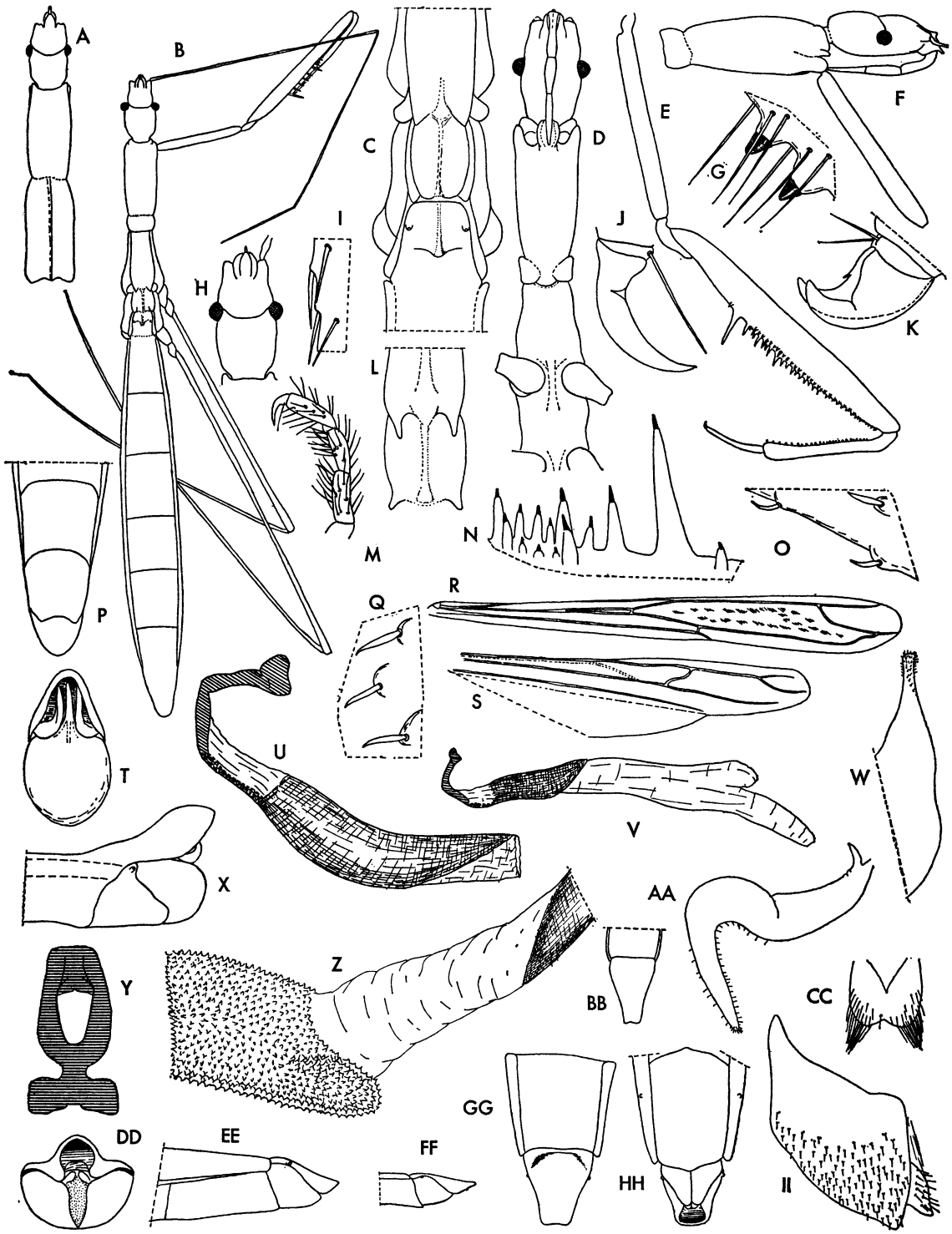
DESCRIPTION: Macropterous or apterous. Medium-sized species (10–14 mm.).

Body surface dull, slightly granulate and rugose. Modified setae short, pointed apically. General color stramineous to ochraceous, without conspicuous pattern elements.

Macropterous form: Head moderately elongate, subrectangular, anteocular about as long as postocular region, latter with sides subparallel in dorsal view, only very slightly convergent posteriorly, rather abruptly constricted at neck. Clypeus somewhat salient; labrum projected in a short but distinct spine. Eyes small; interocular sulcus not surpassing level of posterior border of eyes. Rostrum almost straight, segments not thickened; first segment not reaching level of anterior border of eyes, second segment not or only slightly surpassing level of posterior border of eyes, slightly surpassing level of posterior border of eyes, slightly shorter than first, third about as long as first.

Pronotum completely covering mesonotum; fore lobe subcylindrical; hind lobe with dorsal, longitudinal carina along middle.

Forelegs relatively stout; spined portion occupying about three-fourths of length of femur. Posteroventral series as usual for tribe; apical processes transformed into very short teeth. Anteroventral series interrupted at base; small process situated basad of interruption inserted basad of level of large process of posteroventral series. Fore tibia half as long as femur, ventrally with one series of small, peglike denticles. Fore tarsus half as long as tibia, ventrally with one to two series of deflexed spiniform setae. Two well-developed claws of identical size, inner one medially incised, outer one with minute, submedian projection. Tarsi of mid and hind legs with long setae in moderate number; first and third segments subequal in size, second


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF
GG
HH
II

shortest. Claws regularly curved, with medially incised, ventral lamella.

Forewings attaining about three-fourths of length of abdomen, with discal and subbasal cell; latter not subdivided, about as long as distance between base of discal cell and point of insertion of Pcu as measured along Cu. Pterostigma falling somewhat short of wing tip. Hind wings attaining apex of forewings. Hamus evanescent, gradually approaching and then joining Sc+R. M-cu cross vein absent; M meeting Cu directly basad of level of caesura, then fused to Cu for considerable distance. R+M and Cu not connected to each other, projecting beyond cross vein to wing border; R+M forked subapically. Anal lobe much more than half as long as wing.

Sides of abdomen virtually parallel-sided, keeled below on most segments. Genitalia of both sexes not elevated in relation to longitudinal axis of abdomen.

Male: Last tergite tongue-shaped, very strongly deflexed laterally on apical half, slightly surpassing apex of pygophore. Eighth sternite large, emarginated at center behind. Pygophore not distinctly compressed laterally, rounded in lateral view, its upper posterior border with long, upwardly directed projection, spinelike in posterior, and very slender in lateral, view. Parameres large, sickle-shaped, curved upward. Phallus of normal size, very simple in structure, symmetrical. Phallosoma with apical three-fourths completely sclerotized, pointed apically, its opening directed backward. Endosoma more or less saclike when everted, with 1+1 dorsal, backwardly projected lobes beyond base; extreme base of endosoma membranous, simple, remaining portion with very numerous minute, toothlike processes.

Female: Eighth tergite subhorizontal, much longer than wide at base, narrowed toward apex and truncate distally, with sides strongly deflexed on apical half, forming inverted, troughlike structure. Ninth tergite very small, invisible from above, subvertical, inserted basad of level of apex of eighth tergite. Gonocoxites and gonapophyses separated. Syngonapophysis emarginated apically, its posterolateral angles rounded.

Apterous form: General characters like those of winged form. Pronotum subcylindrical, its hind lobe distinct but covering only extreme base of mesonotum. Mesonotum shorter than pronotum. Metanotum much shorter still, subquadrate. Abdomen faintly fusiform.

TYPE SPECIES: Of *Metapterus*, *Metapterus linearis* Costa (monobasic); of *Carambis*, *Metapterus linearis* Costa (as *Emesa caspica* Dohrn) (monobasic; designated by Stål, 1866); of *Mantisoma*, *Metapterus linearis* Costa (as *Mantisoma aptera* Jakovlev) (monobasic).

DISTRIBUTION: Mediterranean subregion of the Palearctic Region.

OBSERVATIONS: This genus, as understood here, is now restricted to a single species found in the Mediterranean region. The American species formerly included in *Metapterus* are now placed in *Barce* and *Pseudometapterus* (see discussions of these genera).

FIG. 163 (OPPOSITE PAGE). *Metapterus linearis*. A. Head and pronotum of winged female, seen from above. B. Apterous male, general aspect. C. Posterior portion of thorax and base of abdomen of apterous male, seen from above. D. Head and thorax of apterous male, seen from below. E. Foreleg. F. Head and prothorax of apterous male, side view. G. Detail of under surface of fore tibia. H. Head of apterous male, dorsal view. I. Detail of under surface of fore tarsus. J. Claw of hind leg. K. Praetarsus and claws of foreleg. L. Posterior portion of mesonotum and entire metanotum of different apterous male. M. Posterior tarsus. N. Base of series of fore femur. O. Setae of posterior femur. P. Apex of abdomen of male, as seen from below. Q. Setae of sternite. R. Forewing. S. Hind wing. T. Pygophore, seen from behind. U. Phallus, lateral view; endosoma not everted. V. Phallus, lateral view; endosoma everted. W. Posterior portion of pygophore with process, side view. X. Apical portion of abdomen of male, lateral aspect. Y. Articulatory apparatus. Z. Apex of phallosoma and base of partially everted endosoma, high mangification. AA. Paramere. BB. Genital region of female, seen from above. CC. Syngonapophysis. DD. Genital region of female, seen from behind. EE. Apical portion of abdomen of apterous female, lateral view. FF. Genital region of winged female, lateral view. GG. Genital region of apertous female, seen from above. HH. Last abdominal segments of apterous female, seen from below. II. Gonocoxite with gonapophysis.

Though the species are very similar in general aspect and in the characters commonly used for generic classification in the group, a detailed examination of the male genitalia indicates a more rational classification, which is supported by the structure of the claws of the mid and hind legs. Thus, the former puzzle of distribution of the supposedly large genus *Metapterus*, with one species in the Mediterranean region and very many in North and South America, is eliminated.

Metapterus linearis Costa

Figure 163A–Z, AA–II

Metapterus linearis Costa, 1863, p. 336.
Emesa linearis: Mulsant and Rey, 1873, p. 4.
Emesa caspica Dohrn, 1863, p. 66.
Metapterus caspicus: Stål, 1874, p. 96.
Emesa dohrni Douglas and Scott, 1868, p. 136.
Mantisoma aptera Jakovlev, 1874, p. 34, pl. 1, fig. 2.
Metapterus apterus: Jakovlev, 1874, p. 11, pl. 1, fig. 2.

Although at the present time I am willing to accept the existence of only a single species of *Metapterus*, the matter needs clarification. Dohrn (1863) mentioned, for his apparently apterous *Emesa caspica*, "Meso- und Metathorax ziemlich gleichlang," a statement that does not agree with specimens that I have (fig. 163B) or with the figure given by Kiritchenko (1951) of a specimen from Russia. Stål (1874) maintained *Metapterus linearis* and *Metapterus caspicus* as separate species, but in the catalogue by Lethierry and Severin (1896), *caspicus* was treated as a synonym of *linearis*. Kiritchenko (1951) mentioned only *linearis* from Russia, thus seemingly considering *caspicus* a synonym.

The accompanying figures, based on specimens from southern France, illustrate *Metapterus linearis* in detail. The drawings are self-explanatory, but attention is called to the different degrees of development of the eighth tergite in the winged (fig. 163BB) and apterous (fig. 163GG) females, and the variability of the size of the rest of the wing pads in the apterous specimens (figs. 163B, C, L).

Material Examined: France: Arles [British Museum (Natural History)], one macropterous female; La Nouvelle, June 22, 1933 (the American Museum of Natural History), one apterous male; Albi, Tarn, October 1951 (Carayon, the American Museum of Natural History), one apterous male.

Distribution: Circum-Mediterranean, from Spain and Algeria east to the Caspian Sea.

Type: Unknown.

NANDARIVA, new genus

Description: Apterous female: Medium-sized species (22 mm.).

Body surface smooth to rugose, not tuberculate. Setae very sparse and short, modified setae slender, delicately pointed apically. General color castaneous to piceous.

Head elongate-fusiform, anteocular and postocular regions of about equal length, anteocular distinctly higher than postocular. Postocular with sides gradually converging posteriorly, slightly undulate. Clypeus not distinctly elevated, labrum very slightly salient only. Eyes small; interocular sulcus barely surpassing level of posterior border of eyes. Rostrum straight; first segment reaching level of anterior border of eyes, twice as long as second; third about as long as first.

Thorax moderately elongate. Pronotum subcylindrical, only faintly widened anteriorly; hind lobe distinctly marked, not covering mesonotum. Mesonotum and metanotum subequal in size, somewhat shorter than pronotum.

Forelegs relatively stout. Femur with elongate processes bearing short apical spines; spined portion occupying half of length of article. Posteroventral series beginning with very long process, followed by several shorter intermixed with small ones, latter not toothlike on apical section. Anteroventral series interrupted at base, composed of medium-sized and small processes. Tibia slightly longer than one-fourth of length of femur, its ventral surface with one row of small, strongly sclerotized, toothlike denticles. Fore tarsus three-fifths as long as tibia, not segmented, strongly sclerotized, virtually bare above and at sides, ventrally with deflexed spiniform setae. Two simple claws, unequal in size, under surface of inner one with medially incised, low lamella. Mid and hind legs relatively stout, hind femora attaining apex of abdomen. First and third tarsal segments subequal in length, second shortest; their

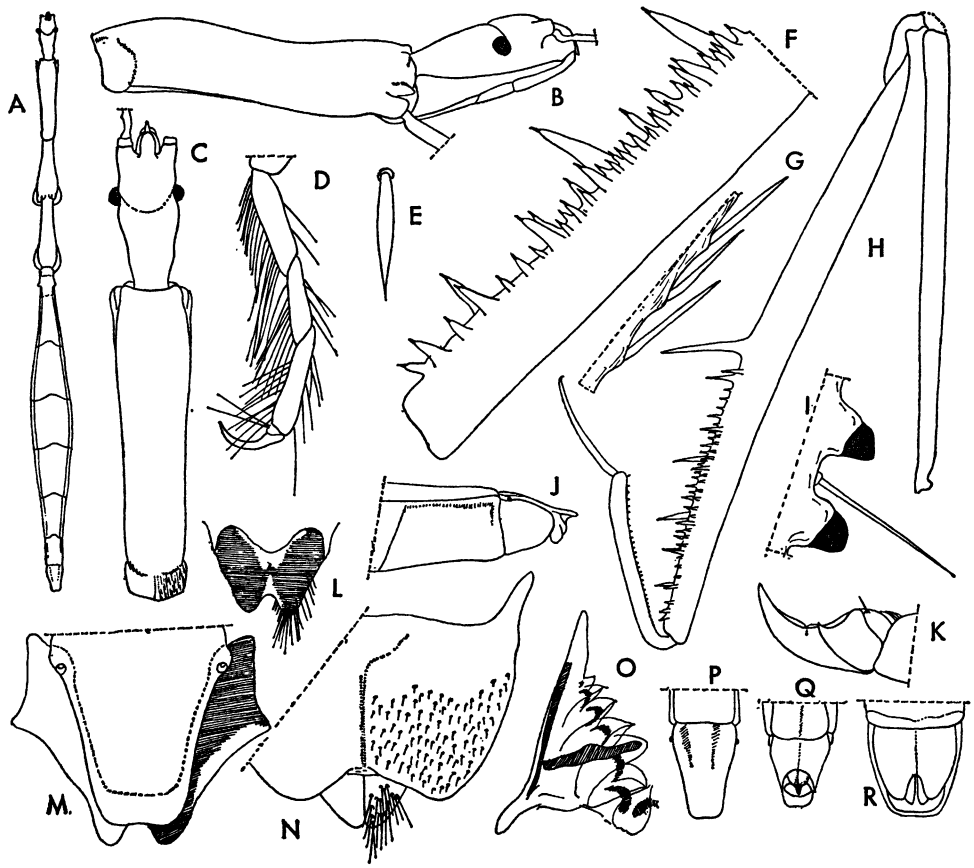


FIG. 164. *Nandariva kondoi*, female. A. General aspect. B. Head and prothorax, lateral view. C. Head and prothorax, dorsal view. D. Posterior tarsus. E. Seta of posterior femur. F. Apical portion of fore femur. G. Spiniform setae of under surface of fore tarsus. H. Fore femur. I. Denticles of under surface of fore tibia. J. Distal portion of abdomen, lateral view. K. Praetarsus and claws of foreleg. L. Syngonapophysis. M. Eighth and ninth tergites, as seen on slide mount; pigmentation of ninth tergite shown on right side. N. Gonocoxite with gonapophysis. O. Posterior gonapophysis. P. Apex of abdomen, dorsal view. Q. Apex of abdomen, seen from below. R. Genital region, posteroventral view.

under surface with moderate number of very long simple bristles. Claws slender, moderately curved, their under surface like that of inner claw of foreleg.

Abdomen fusiform, widened at middle, not or only slightly keeled below. Genital region not elevated in relation to rest of abdomen. Eighth tergite subhorizontal, large, truncate apically. Ninth tergite small, vertical, inserted below eighth tergite, not visible from above, excised posteriorly, lacking apical projection at center. Gonocoxites almost completely fused to each other. Gonapophyses separated. Syngonapophysis emarginated at apex.

TYPE SPECIES: *Nandariva kondoi*, new species.

ETYMOLOGY: Derived from Nandarivatu, locality on Viti Levu.

DISTRIBUTION: Fiji Islands.

OBSERVATIONS: The male of *Nandariva* is not known, and it is thus difficult to establish its affinities. The similarity of many of its key characters with those of *Metapterus* and *Barce* is not necessarily indicative of close relationships.

Nandariva kondoi, new species

Figure 164A–R

DISTRIBUTION: Apterous female: Length, 21.9 mm.; head, 1.8; prothorax, 3.2; mesothorax, 2.2; metathorax, 2.2; abdomen, 12.5 mm.

Head and thorax castaneous. Abdomen piceous, first and second as well as sixth, seventh, and eighth segments testaceous, third and fourth connexival segments with testaceous spot apically, respective sternites with submedian spot laterally. Antennae, rostrum, and legs castaneous; mid and hind femora with three or four narrow, faint, luteous annuli; median tibia with two, hind tibia with three, similar annuli. Surface of head and thorax smooth, almost dull, microscopically reticulate. Abdomen rugose, coarsely and irregularly on dorsal, more delicately and approximately longitudinally on ventral, surface. Pilosity sparse, short, golden.

Head and rostrum as shown in figure 164A–C. Length of first segment of antennae, 9.2 mm.; relative length of segments, 1/0.8/-0.025/0.25.

Thorax as given in generic description and shown in figure 164A-C. Posterior border of hind lobe of pronotum conspicuously salient in middle. Mesonotum with a faint, median, longitudinal carina. Prothorax slightly S-shaped in lateral view.

Forelegs as given in generic description and shown in figure 164F–I, K. Coxa slightly longer than prothorax. Posteroventral series of femur composed of one large, four medium-sized, and 24 small and very small, processes; two median, medium-sized processes out of line with remainder. Anteroventral series composed of six or seven medium-sized and 17 small processes. Mid and hind legs as given in generic description and shown in figure 164D, E.

Abdomen as given in generic description and shown in figure 164J, M, P–R. Gonocoxites, gonapophyses, styloids, and syngonapophyses as shown in figure 164L, N, O.

MATERIAL EXAMINED: Fiji: Viti Levu: Navai Mill, near Nandarivatu, September 12, 1938, 2500 feet (Y. Kondo; Bernice P. Bishop Museum), one female holotype.

ONYCHOMESA, NEW GENUS

DESCRIPTION: Macropterous or micropterous. Medium-sized species (13–15 mm.).

Body surface dull, smooth, not tuberculate. Setae sparse and short; modified setae rather short, delicately pointed apically. Head and thorax dorsally with numerous light-colored, scalelike, modified setae arranged in regular rows. General color brown.

Macropterous male: Head subrectangular in lateral view, anteocular and postocular regions of about equal length. Sides of postocular region undulate, faintly or distinctly converging posteriorly. Clypeus and labrum lacking projections. Eyes small; interocular sulcus not surpassing level of posterior border of eyes. Rostrum straight; first segment slightly longer than second, its apex remote from anterior border of eyes; third somewhat longer than first. Antennae inserted near apex of head.

Thorax moderately elongate. Pronotum not covering mesonotum; anterior portion of prothorax subcylindrical, hind lobe of pronotum distinctly separated from fore lobe, collar-like.

Forelegs not very delicate. Femora parallel-sided, spined portion slightly longer than half of length of article. Posteroventral series composed of one long, several medium-sized, and many short processes, apical spines of last often longer than processes themselves, spines on apical portion of segment transformed into short teeth. Anteroventral series interrupted at base, composed of several medium-sized and many small spiniferous processes. Tibia attaining one-third of length of femur, ventral surface with one row of strongly chitinized, small, peglike denticles. Fore tarsus not segmented, slightly more than half of length of tibia, ventrally with one or two rows of deflexed spiniform setae. Claws of forelegs slightly to considerably unequal in size, inner one with medially incised, ventral lamella, outer one with small, submedian projection. Mid and hind legs slender, but not surpassing apex of abdomen; their tarsi slender, first segment slightly longer than third, second shortest, all with rather long setae on ventral surface, setae on apex of first segment conspicuously bent subapically. Claws of mid and hind legs regularly curved, ventrally with low, medially incised lamella, on apical por-

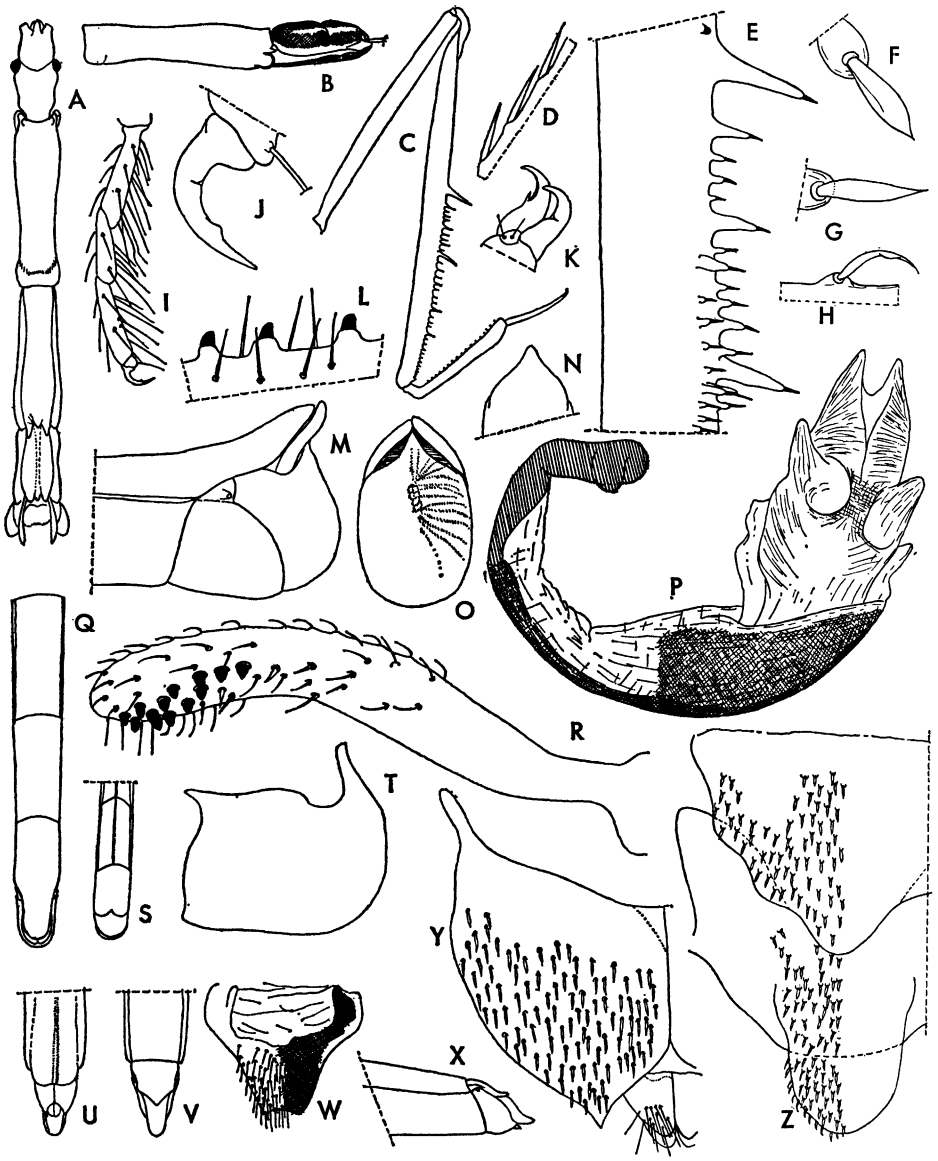


FIG. 165. *Onychomesa sauteri*. A. Head and thorax, dorsal view. B. Head and prothorax, lateral view; color pattern shown on head only. C. Foreleg. D. Spiniform setae of under surface of fore tarsus. E. Base of series of fore femur. F. Seta of gonocoxite. G, H. Setae of posterior femur, different views. I. Posterior tarsus. J. Claw of hind leg. K. Claws of foreleg. L. Detail of under surface of fore tibia. M. Apex of abdomen of male, side view. N. Apex of pygophore. O. Pygophore, seen from behind; surface sculpture shown on one side only. P. Phallus, lateral view, with endosoma everted and somewhat twisted. Q. Apical segments of abdomen of male, dorsal view. R. Pygophore. S. Apex of abdomen of male, ventral aspect. T. Pygophore, lateral view. U. Apex of abdomen of female, seen from below. V. Apex of abdomen of female, dorsal view. W. Syngonapophysis. X. Distal portion of abdomen of female, lateral aspect. Y. Gonocoxite with gonapophysis. Z. Eighth and ninth tergites of female, as seen on slide mount; setae shown on left side only.

tion with a more or less prominent, triangular tooth.

Fore and hind wings falling considerably short of tip of abdomen, but complete. Forewings with discal cell and basal cell, latter not subdivided, about as long as distance between base of discal cell and point of insertion of Pcu on cell, measured along Cu. Pterostigma not attaining apex of wing. Hind wings reaching to tip of forewings. Hamus slightly evanescent, gradually approaching and then joining Sc+R. M-cu cross vein absent. M meeting Cu basad of level of caesura, fused to Cu for considerable distance. R+M and Cu simple, projecting beyond cross vein to near wing margin, not connected to each other; R+M abruptly curved downward on apical portion. Anal lobe three-fourths as long as wing.

Abdomen slender, parallel-sided, keeled below on most segments. Genital region not elevated in relation to rest of abdomen. Last tergite reaching apex of pygophore. Eighth sternite straight or incised at middle behind. Pygophore short, subsemicircular in lateral view, with or without short projection posteriorly above, anterior dorsal bridge narrow. Parameres short, rod-shaped, with several conical spines in addition to bristles on inner surface. Phallus symmetrical. Basal plates short, fused. Phallosoma relatively short, subcylindrical, somewhat wider on apical than on basal half, sclerotized on apical half laterally and ventrally along whole length. Posterior opening of phallosoma situated posterodorsally. Endosoma membranous, rather short, saclike when everted, somewhat incised apically and with various short projections.

Micropterous male and female: General characters like those of macropterous form. Thorax only moderately elongate. Prothorax subcylindrical, hind lobe distinct, short. Mesonotum somewhat shorter than pronotum, metanotum distinctly shorter than mesonotum, combined longer than pronotum; mesonotum with minute wing pads.

Abdomen and genitalia of male like those of winged form. Genital region of female not elevated in relation to rest of abdomen. Eighth and ninth tergite large, forming continuous, somewhat inclined surface. Eighth tergite subpentagonal, pointed behind; ninth elongate tongue-shaped. Gonocoxites separated, pointed posteriorly. Gonapophyses not fused. Syngonapophysis slightly emarginated apically.

TYPE SPECIES: *Onychomesa susainathani*, new species.

ETYMOLOGY: *Onyx*, *-ychos*, fingernail; and *Emesa*, a genus of the Emesinae.

DISTRIBUTION: Oriental Region.

OBSERVATIONS: This genus seems closest to *Pelmatomesa*. In addition to the characters mentioned in the key, *Onychomesa* and *Pelmatomesa* differ from each other also by the male genitalia (presence or absence of spines on the parameres, different shape of the phallosoma, and other characters).

Both species included in *Onychomesa* are new. Possibly *Ischnonyctes alatus* Distant also belongs in *Onychomesa*. The species was placed as a synonym of *Schidium marcidum* by Wygodzinsky (1956), following a suggestion by McAtee and Malloch (1926).

KEY TO THE SPECIES OF *Onychomesa*

Micropterous; claws of forelegs subequal in size (fig. 165K), those of mid and hind legs with rather inconspicuous projection (fig. 165J); projection of pygophore elongate, pointed (fig. 165 O, T); phallus as shown in figure 165P . . . . . *sauteri*

Fully winged; claws of forelegs unequal in size (fig. 166K), those of mid and hind legs with pointed, triangular projection (fig. 166H); projection of pygophore blunt (figs. 166L, P); phallus as shown in figure 166N . . . . . *susainathani*

Onychomesa sauteri, new species

Figure 165A–Z

DESCRIPTION: Micropterous male and female: Total length of male, 13–14; of female, 14.5–15.5 mm.; male: head, 1.1; thorax, 4.9; abdomen, 8.0 mm.

General color castaneous. Dorsal surface of head with faint lighter brown pattern, ventral surface luteous. Rostrum rather uniformly dark. Abdomen very faintly mottled with lighter color, mainly on dorsal surface, latter with three not very distinct, longitudinal, red lines. Antennae uniformly castaneous. Coloring of legs much like that of *susainathani* (see below); however, pattern not strongly marked and mostly difficult to observe.

Head as shown in figure 165A, B, sides only

moderately converging posteriorly in dorsal view, rather abruptly constricted at neck. Eyes small in both sexes, less than half as high as head. Length of first segment of antennae (female), 6 mm.; relative length of segments, 1/0.8/0.05/0.28.

Thorax as given in generic description and shown in figure 165A, B. Wing pads of mesonotum variable in size.

Legs as shown in figure 165C–E, G–L, much like those of *susainathani*, but claws of forelegs subequal in size, those of mid and hind legs more strongly curved and triangular projection less prominent.

Abdomen as given in generic description, its surface microscopically reticulate, keeled to seventh segment.

Male: Genital region as shown in figure 165M, Q, S. Eighth sternite distinctly incised behind at center. Pygophore (fig. 165M–O, T) subglobular, rather coarsely rugose, its posterodorsal border more salient than in *susainathani*. Parameres as shown in figure 165R; phallus, in figure 165P.

Female: Genital region as given in generic description and shown in figure 165U, V, X; genital sclerites as shown in figure 165W, Y, Z.

MATERIAL EXAMINED: Formosa: Anping, 1911 (H. Sauter; the American Museum of Natural History), one male holotype, one female allotype, two male paratypes.

Onychomesa susainathani, new species

Figure 166A–S

DESCRIPTION: Macropterous male: Total length, 14 mm.; head, 1.1; thorax, 5.1; abdomen, 7.8 mm.

General color fuscous. Head and thorax mottled with flavous, dorsally some not very well-defined longitudinal lines, rather uniformly flavous ventrally. Rostrum light-colored, only last segment darkened. Abdomen darker posteriorly, mottled with flavous dorsally and ventrally, dorsum with three longitudinal, red lines. Antennae brown, first segment piceous distally, extreme apex with narrow whitish annulus. Forewings cinereous, veins limiting apex of discal cell fuscous, discal cell with not very numerous small, dark dots. Forelegs of general color, with extensive fuscous pigment as shown in figure 166G. Mid and hind legs fuscous, femora piceous distally, with four or five evenly distributed, narrow, luteous annuli, tibia with two or three similar annuli on basal portion.

Head as given in generic description and shown in figure 166A, B, rather conspicuously and regularly narrowed posteriorly in dorsal view. Eyes large, more than half as high as head. Length of first antennal segment, 7 mm.; relative length of segments, 1/0.85/-0.04/0.25.

Thorax as given in generic description and shown in figure 166A, B.

Forelegs as given in generic description and shown in figure 166F, G, K, M. Coxa one-fourth longer than prothorax. Posteroventral series of femur composed of one large, three medium-sized, and about 40 small, spiniferous processes, anteroventral series consisting of three medium-sized and 20 small processes. Tibia with 25 denticles. Claws of forelegs rather slender, unequal in size (fig. 166K). Mid and hind legs as given in generic description and shown in figure 166H–J; claws only moderately curved, triangular projection conspicuous.

Forewings as given in generic description and shown in figure 166C, their length 6.8 mm.; reaching almost to apex of fifth abdominal segment. Hind wings (fig. 166D) attaining apex of forewings.

Abdomen as given in generic description, its surface microscopically reticulate, keeled ventrally to seventh segment. Eighth sternite almost straight behind. Genital region as shown in figure 166L, P, Q, S. Pygophore slightly compressed laterally, its posterior surface above with a faintly marked keel, its posterodorsal border with a short, blunt projection. Parameres as shown in figure 166 O, R; phallus, in figure 166N.

MATERIAL EXAMINED: Central India: Jahalpur, September, 1957 (Susai Nathan; the American Museum of Natural History), one male holotype, one male paratype.

PELMATOMESA, NEW GENUS

DESCRIPTION: Apterous. Medium-sized species (18–19.5 mm.).

Body surface from subshining to rugose, not tuberculate. Setae sparse and very short, modified setae rounded apically. General color flavous.

Head subrectangular in dorsal and lateral

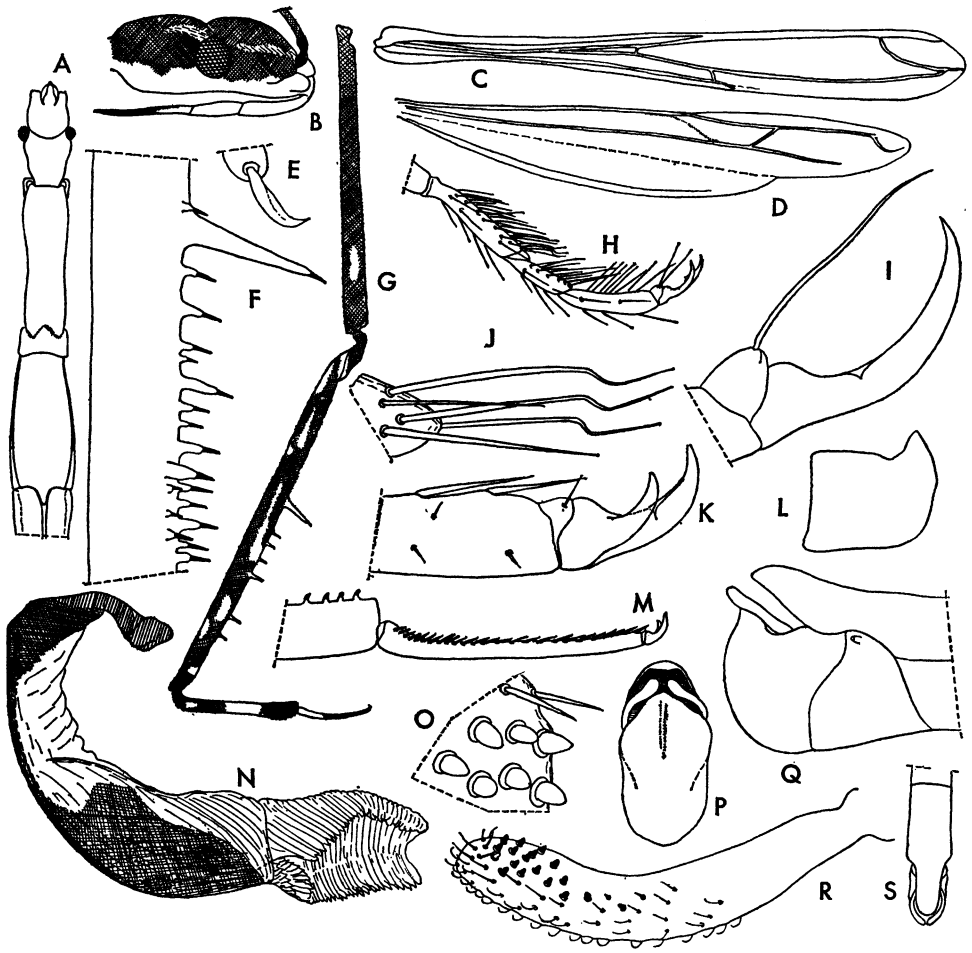


FIG. 166. *Onychomesa susainathani*, male. A. Head and thorax, seen from above. B. Head, lateral aspect, with color pattern. C. Forewing. D. Hind wing. E. Seta of hind femur. F. Base of series of fore femur. G. Foreleg, with color pattern. H. Posterior tarsus. I. Praetarsus and claw of hind leg. J. Setae of apical portion of under surface of first segment of hind tarsus. K. Apex of fore tarsus, with claws. L. Pygophore, lateral view. M. Apex of tibia with tarsus of foreleg. N. Phallus, lateral view. O. Detail of apex of paramere. P. Genital region, seen from behind. Q. Apex of abdomen, lateral aspect. R. Paramere. S. Apex of abdomen, dorsal view.

views, anteocular and postocular regions of about equal length. Postocular region with sides strongly undulate, somewhat converging posteriorly, strongly but not abruptly constricted at neck in dorsal view. Clypeus and labrum not salient. Eyes very small; interocular sulcus not surpassing level of posterior border of eyes. Rostrum straight; first segment slightly longer than second, its apex remote from anterior border of eyes; third about as long as first. Antennae inserted near apex of head.

Thorax moderately elongate. Prothorax subcylindrical; hind lobe distinctly marked, collar-like. Mesonotum and metanotum combined shorter than pronotum, metanotum shorter than mesonotum.

Forelegs rather short. Femur with spiniferous processes bearing short, apical spines; these processes beginning somewhat before

middle of article. Posteroventral series beginning with elongate process followed by series of shorter and very short ones, latter transformed on apical portion of article into very short teeth. Anteroventral series interrupted at base, composed of medium-sized and short processes. Tibia slightly more than one-third of length of femur, its ventral surface with one series of small, strongly sclerotized, toothlike denticles. Fore tarsus slightly more than half as long as tibia, not segmented, strongly sclerotized, virtually bare above and at sides, ventrally with deflexed spiniform setae. Two simple claws of subequal size, inner one with medially incised, ventral lamella, outer one with a small, subbasal projection. Mid and hind legs relatively short, hind femora slightly surpassing apex of abdomen. Tarsus of mid and hind legs with basal segment longest, second shortest; all on ventral surface with very numerous, moderately elongate bristles, those of third segment thickened apically, almost erect, forming scopula. Claws of mid and hind legs slender, regularly curved, with medially incised, ventral lamella and elongate, curved, pointed projection shortly behind middle.

Abdomen moderately slender, sides subparallel, keeled below on most segments. Genital region in both sexes not elevated in relation to rest of abdomen.

Male: Last tergite reaching apex of pygophore. Eighth sternite large, emarginated at center behind. Pygophore relatively short, strongly compressed laterally, subquadrate in outline, anterior dorsal bridge short, posterior border dorsally only slightly salient, with low lamellar structure beset with tiny bristles. Phallus symmetrical. Basal plates short, fused; phallobase elongate-cylindrical, its base sclerotized at sides and below, its apical half almost completely sclerotized. Endosoma membranous, apparently rather simply tubular (not examined in everted condition). Parameres slender, rod-shaped, with simple bristles only.

Female: Eighth and ninth tergites large, forming continuous, somewhat inclined surface. Eighth tergite subquadrate, ninth subtriangular. Gonocoxites and gonapophyses separated. Syngonapophysis slightly emarginated apically.

TYPE SPECIES: *Pelmatomesa sarophora*, new species.

ETYMOLOGY: *Pelma, pelmatos*, sole of the foot; and *Emesa*, a genus of the Emesinae.

DISTRIBUTION: Austral Islands.

OBSERVATIONS: This genus is well characterized by the male and female genitalia and mainly by the chaetotaxy of the mid and hind tarsi and the structure of their claws.

Two fifth-instar nymphs examined were found to be very similar in general appearance to the adult. The claws of their mid and hind legs are like those of the adult; the second segment of the two-segmented tarsus bears a scopula similar to that of the adult.

Pelmatomesa sarophora, new species

Figure 167A–Y

DESCRIPTION: Apterous male and female: Length of male, 18 mm. (head, 1.8; thorax, 5.4; abdomen, 10.8 mm.); of female, 19.5 mm.

General color flavous. Head and thorax laterally with wide, longitudinal, fuscous fascia. Pattern of dorsal surface of head as shown in figure 167A, in some cases clypeus also pigmented. First and second rostral segments somewhat darkened. Antennae of general color; first segment darkened distally, extreme apex narrowly white. Thorax more or less darkened above, lateral borders of mesonotum and metanotum stramineous; disc of thoracic nota with more or less conspicuous, median, longitudinal line luteous, anteriorly bifurcated on pronotum. Abdomen fuscous ventrally, posterior border of last sternites fulvous; pygophore and parameres dark. Tergites dark at sides and with 1+1 percurrent reddish lines; center of tergites luteous. Forelegs of general color, pattern dark, as shown in figure 167C. Coxae and trochantera of mid and hind legs dark; femora with four dark annuli: one subbasal, two submedian, and one subapical, dark as wide as clear-colored areas. Tibiae with two or three wide annuli on basal portion.

Head and rostrum as given in generic description and shown in figure 167A, B. Eyes of male and female identical in size. Length of first segment of antennae (male), 9 mm.; relative size of segments, 1/0.9/0.04/0.1.

Thorax as given in generic description and shown in figure 167A, B; hind lobe of prono-

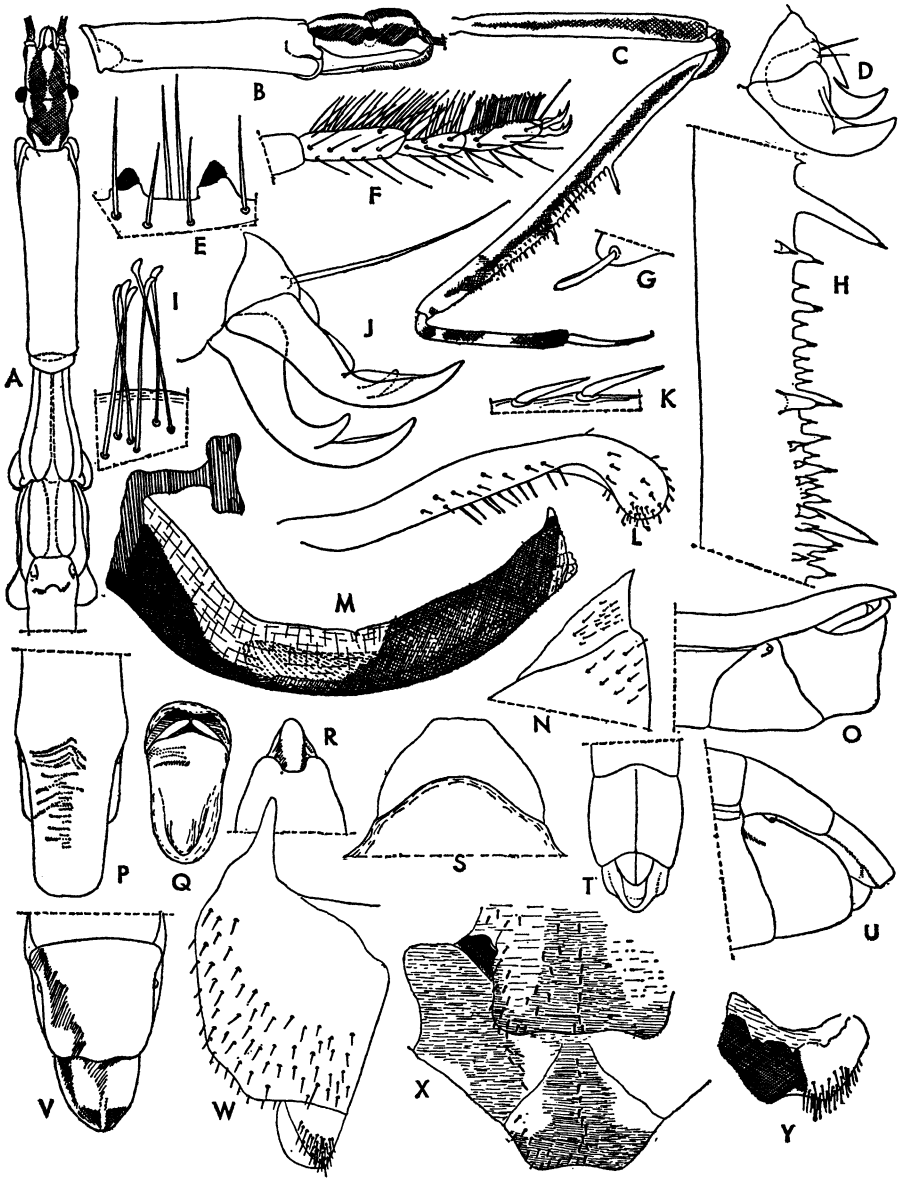


FIG. 167. *Pelmatomesa sarophora*. A. Anterior portion of body, dorsal view; color pattern shown on head only. B. Head and prothorax, lateral view; color pattern shown on head only. C. Foreleg, with color pattern. D. Praetarsus and claws of foreleg. E. Detail of under surface of fore tibia. F. Tarsus of hind leg. G. Seta of posterior femur. H. Base of series of fore femur. I. Capitate setae of under surface of third segment of posterior tarsus. J. Praetarsus and claws of hind leg. K. Spiniform setae of under surface of fore tarsus. L. Paramere. M. Phallus, lateral view; basal half of articulatory apparatus in front view. N. Apex of pygophore, lateral view, high magnification. O. Distal end of abdomen of male, side view. P. Apex of abdomen of male, seen from above; sculpture shown on left side only. Q. Genital region of male, seen from behind. R. Genital region of male, seen from below. S. Apex of pygophore, seen from behind, high magnification. T. Genital region of female, seen from below. U. Genital region of female, lateral aspect. V. Apex of abdomen of female, seen from above. W. Gonocoxite and gonapophysis. X. Last tergites of female, as seen on slide mount. Y. Syngonapophysis.

tum very short; mesonotum and metanotum with low longitudinal carina along center, in some very faint.

Forelegs as given in generic description and shown in figure 167C–E, H, K. Coxa longer than prothorax (1/0.75). Posteroventral series of femur composed of one large basal process as long as, or longer than, diameter of segment, and about four medium-sized and 30 small processes; anteroventral series composed of two medium-sized and 25 small processes. Tibia with about 30 denticles. Mid and hind legs as given in generic description and shown in figure 167F, G, I, J; hind femora surpassing apex of abdomen by about 3 mm.

Abdomen as given in generic description, conspicuously rugose dorsally and ventrally, wrinkles approximately longitudinal, coarse on dorsal and delicate on ventral surface. Genitalia of male as given in generic description and shown in figure 167L–S; endosoma not examined in detail. Genitalia of female as given in generic description and illustrated in figure 167T–Y.

MATERIAL EXAMINED: Austral Islands: Tubuai, southwest ridge of Mt. Taita, August 20–23, 1934, beating ferns (E. C. Zimmerman; Bernice P. Bishop Museum), one male holotype, one female allotype, one male and one female paratypes, two fifth-instar nymphs; (E. C. Zimmerman; the American Museum of Natural History), one male paratype.

PSEUDOBARGYLIA WYGODZINSKY

Bargylia: WYGODZINSKY, 1950c, p. 241 (*nec* Stål, 1865, 1874).

Pseudobargylia WYGODZINSKY, 1951b, p. 610.

DESCRIPTION: Apterous. Elongate, parallel-sided; medium-sized to large species (14.5–21.5 mm.).

Body surface smooth, not shining, delicately tuberculate, rugose. Setae sparse and very short, modified setae delicately pointed apically. General color stramineous to piceous, no conspicuous pattern.

Head moderately elongate, anteocular and postocular regions subequal in length; sides of postocular subparallel or somewhat converging posteriorly in dorsal view. Clypeus lacking projection; labrum prolonged into short, downwardly directed spine. Eyes very small. Interocular sulcus not attaining, attaining, or surpassing level of posterior border of eyes. Rostrum virtually straight; first segment not surpassing level of center of eyes; second very short; third about as long as first. Antennae inserted near apex of head.

Pronotum longer than either mesonotum or metanotum, subcylindrical, its hind lobe distinctly marked, collar-like. Mesonotum as long as, or somewhat longer than, metanotum; combined length either slightly shorter or slightly longer than pronotum.

Forelegs delicate. Femur with spiniferous processes bearing short, apical spines; these processes arising considerable distance from base of article. Posteroventral series beginning with very long process, followed by series of several shorter and intermixed with very numerous small ones. Anteroventral series interrupted at base, composed of medium-sized and small processes. Tibia shorter than half of length of femur, on ventral surface with one series of small, strongly chitinized denticles. Fore tarsus attaining about one-third of length of tibia, two-segmented, basal longer than apical segment; segments strongly sclerotized, virtually bare above and at sides, ventrally with deflexed, spiniform setae. Two simple claws of subequal size, lacking ventral lamellae or processes. Mid and hind legs relatively short, hind femora not surpassing apex of abdomen. Mid and hind tarsi with basal segment longer than either second or third, last subequal; claws relatively long and slender, under surface with elongate, subbasally incised, lamellar structure.

Abdomen longer than head and thorax combined, sides subparallel, not conspicuously widened; keeled below. First tergite transverse, rectangular.

Male: Last tergite elongate tongue-shaped, covering pygophore completely from above. Eighth sternite emarginated at center behind. Pygophore varied in shape, with conspicuous process at posterosuperior margin; anterior dorsal bridge very short. Parameres rodlike, apically curved, with short hairs, apically with spinelike setae. Phallus symmetrical. Basal plates short, fused. Phallobase moderately elongate, its walls with continuous or subbasally interrupted, apically pointed sclerotization; opening of phallosoma posterodorsally directed. Endosoma either ap-

proximately tubular when everted and with numerous toothlike projections, or short and saclike and with various membranous processes.

Female: Eighth tergite large, subhorizontal, truncate or faintly emarginated behind; in one species (*leai*) deeply incised; ninth tergite relatively large, subhorizontal to subvertical, forming continuous surface with eighth, distinctly visible from above; in *leai*, ninth tergite strongly reduced, forming two tongue-shaped lobes situated within incision of eighth tergite. Gonocoxites separated, in some cases each with posterolateral projection. Syngonapophysis entire or emarginated apically.

TYPE SPECIES: *Emesa iuncea* Erichson (by original designation).

DISTRIBUTION: Australian Region.

OBSERVATIONS: Among the species here included in *Pseudobargylia*, two different groups emerged on detailed examination of the male genitalia. In one group, including *iuncea*, *waratah*, *additita*, and *brunneri*, the endosoma bears numerous toothlike spines and assumes a tubular shape when everted (fig. 169N–Q). The other group, comprising *leai*, *revoluta*, *marsupialis*, and probably *brewarrina*, is characterized by the endosoma which lacks the spines mentioned, and which is short and irregularly saclike when everted (fig. 168I, HH). As the female of only one species of the latter group, *leai*, is known, it cannot be said at the present time whether the female genitalia show correlated characters which would enable us to separate the second group generically from the first, which contains the type species. No other characters have been found that would permit such a division.

Pseudobargylia seems to be the dominant metapterine genus in Australia, both in number of species and in individuals.

KEY TO THE SPECIES OF *Pseudobargylia*

1. First segment of rostrum attaining level of center of eye; mesonotum and metanotum combined slightly shorter than pronotum; ninth tergite of female transformed into two elongate, tongue-shaped lobes inserted in deep incision of eighth tergite (figs. 168H, O); eighth sternite of male with 1+1 conspicuous, elongate, lateral projections which, in lateral aspect, are longer than main body of sternite (fig. 168G) . . *leai*

   First segment of rostrum not quite attaining level of anterior border of eyes (figs. 168T; 169B); mesonotum and metanotum combined slightly longer than pronotum (fig. 168A); genitalia of both sexes not as above 2

2. Females 3

   Males 6

3. Seventh sternite rounded behind (fig. 169Z); ninth tergite almost vertical (fig. 169U), its posterior border broadly and shallowly emarginate (fig. 169Y), shorter than eighth when seen from above (fig. 169Y) . . . . . *brunneri*

   Seventh sternite salient behind at middle (fig. 169T; 170M); ninth tergite subhorizontal, as long as, or longer than, eighth when seen from above, deeply excised behind at middle (figs. 169S; 170L, Q) 4

4. Eighth tergite distinctly shorter than wide (figs. 169DD; 170H); gonocoxites with conspicuous lateral projection (figs. 169AA; 170L, M, R) 5

   Eighth tergite about as long as wide (fig. 169S); gonocoxites lacking lateral projection . . . . . *iuncea*

5. Length of pronotum equal to about four times its maximum height in lateral view (fig. 169BB); lateral projection of gonocoxites large, pointed, surpassing apex of lobe (fig. 169AA) . . . . . *involucrata*

   Pronotum slightly less than three times as long as maximum width in lateral view (fig. 170C); lateral projections of gonocoxites small, rounded apically, not attaining level of apex of lobes (fig. 170M, R) . . . . . *waratah*

6. Posterosuperior region of pygophore elongate, slender, almost pointed when seen from behind (fig. 168B, BB, EE); lateral borders of eighth sternite with regular outlines (fig. 168C, CC, GG); endosoma lacking spinelike teeth (fig. 168HH) 7

   Posterosuperior region of pygophore more or less truncate, often surmounted by laminate projection (figs. 169K; 170T, Z); lateral borders of eighth sternite with somewhat irregular outlines (figs. 169M, V; 170X, Y); endosoma with numerous spinelike teeth (fig. 169N) 9

7. Pronotum five times as long as maximum height in lateral aspect (fig. 168Y); fore femur about 20 times as long as maximum width (fig. 168Y); lateral borders of postocular region of head subparallel when seen from above (fig. 168V) . . . . . *revoluta*

   Pronotum only about three times as long as

maximum height in lateral aspect (fig. 168T); fore femur less than 20 times as long as wide (fig. 168T); lateral border of postocular portion of head converging posteriorly in dorsal view (fig. 168A, S) 8

8. Size, about 18 mm.; mesonotum and metanotum of equal length (fig. 168A); abdomen about 20 times as long as maximum width; parameres gradually widened toward apex (fig. 168D) . . . . . *brewarrina*

Size, about 12 mm.; metanotum distinctly shorter than mesonotum (fig. 168Z); abdomen about 14 times as long as maximum width; parameres abruptly and conspicuously widened on apical third (fig. 168AA) . . . . . *marsupialis*

9. Metanotum distinctly shorter than mesonotum (figs. 169A; 170A) 10

Metanotum not shorter than mesonotum (fig. 169X) . . . . . *brunneri*

10. Size, less than 15 mm.; pronotum in lateral view less than three times as long as maximum height (fig. 170C); pygophores as shown in figure 170T, X–Z 11

Size, more than 15 mm.; pronotum at least three times as long as maximum length in lateral view (fig. 169B); pygophore as shown in figure 169K, M . . . . . *iuncea*

11. Hind border of pygophore subrectangular in lateral aspect (fig. 170Y), its upper superior border with 1+1 emarginations at base of projection (fig. 170Z) . . . . . *additita*

Hind border of pygophore subsemicircular in lateral view (fig. 170X); borders of apical projection continuous with those of rest of pygophore (fig. 170T) . . . . . *waratah*

Pseudobargylia additita, new species

Figure 170W, Y, Z

This species agrees with *waratah*, described below, in size, coloring, general aspect, and proportions of the body parts. It can be distinguished by the differently shaped pygophore, which is salient behind and below in lateral view (fig. 170Y) and the superior portion of which is quite different in shape (fig. 170Z). The parameres, though slightly larger, have the same shape and chaetotaxy as in *waratah*, and the phallus seems identical.

MATERIAL EXAMINED: Tasmania: Mt. Wellington (Lea; South Australian Museum), one male holotype.

Pseudobargylia brewarrina Wygodzinsky

Figure 168A–D

Pseudobargylia brewarrina WYGODZINSKY, 1956, p. 201, figs. 38–46.

DISTRIBUTION: Australia (New South Wales).

TYPE: Male, Entomology Branch, Department of Agriculture, Sydney.

Pseudobargylia brunneri (Wygodzinsky)

Figure 169U–Z

Bargylia brunneri WYGODZINSKY, 1950c, p. 244, figs. 12–20.

Pseudobargylia brunneri: WYGODZINSKY, 1951b, p. 610.

DISTRIBUTION: Northern Australia.

TYPE: Male, Naturhistorisches Museum, Vienna.

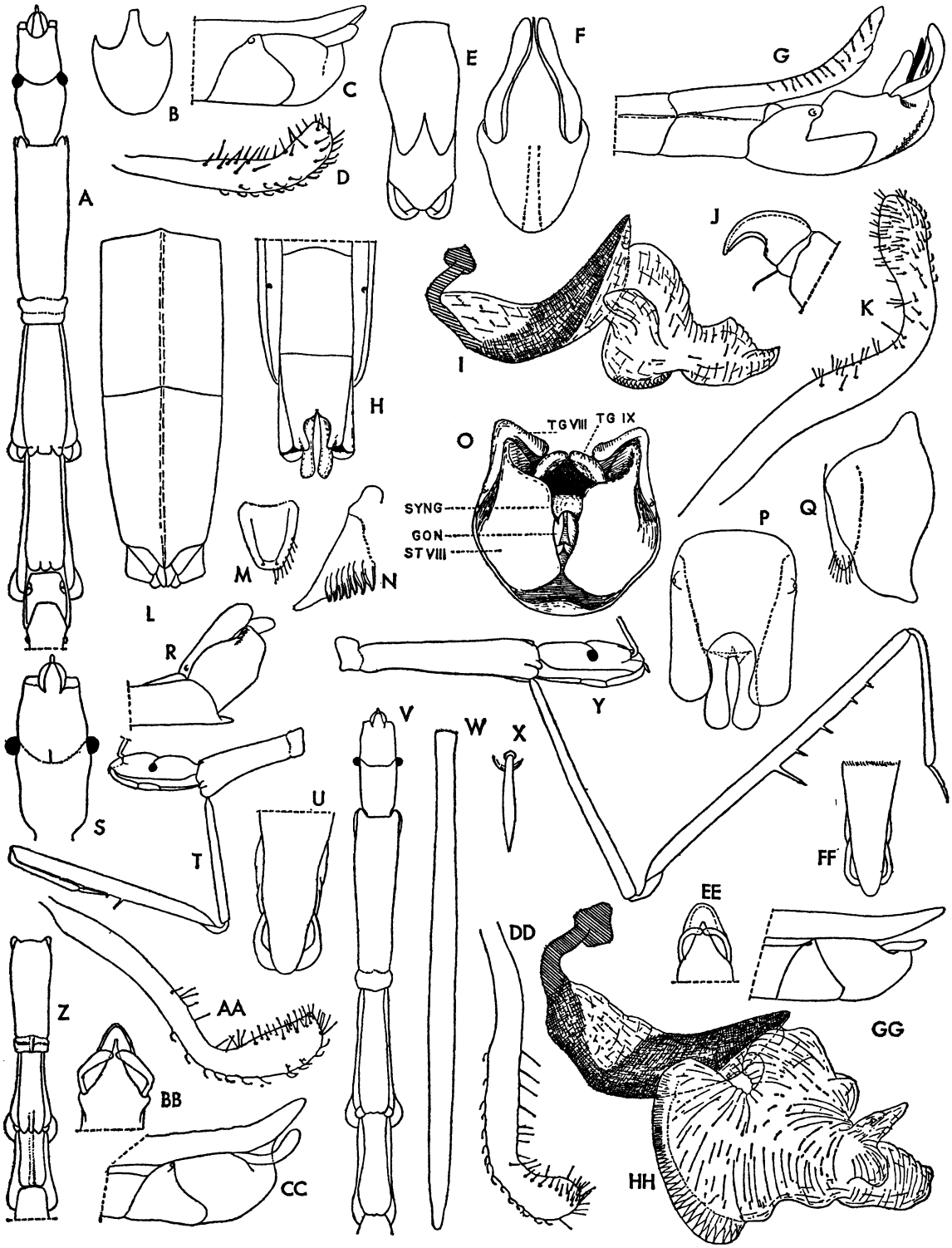
Pseudobargylia involucrata, new species

Figure 169AA–DD

DESCRIPTION: Female: Length of body, 19.8 mm.; head, 1.8; thorax, 5.7; abdomen, 12.3 mm.

Color of head and thorax testaceous, lateral regions irregularly darkened. Head not distinctly lighter-colored ventrally than dorsally. Abdomen stramineous, dorsally with three narrow, longitudinal, reddish lines, irregularly mottled with dark ventrally. Rostrum and antennae testaceous, first segment of antennae with wide, subapical, piceous annulus, extreme apex whitish; apex of second segment, and third and fourth segments entirely, fuscous. Forelegs stramineous; coxa on anterior and posterior surfaces almost completely fuscous; ventral surface of femur piceous, this color also widely extended on anterior and posterior surface. Tibia piceous on basal half and apical fourth, rest testaceous; tarsus piceous, basal fourth testaceous. Acetabula of mid and hind legs and their coxae and trochantera almost completely dark piceous, coxae slightly mottled with stramineous; femora of mid and hind legs piceous, with four or five not very distinct testaceous annuli, testaceous regions somewhat shorter than piceous; mid and hind tibiae piceous, with three subbasal annuli and apex testaceous. Surface of head and thorax smooth, abdomen heavily reticulate-rugose, slightly shining.

Head and rostrum as shown in figure 169BB, CC; postocular region with sides rather strongly converging posteriorly in dorsal view. Length of first segment of antennae,


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
TG VIII
TG IX
SYNG
GON
ST VIII
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF
GG
HH

8 mm.; relative length of segments, 1/0.85/-0.065/0.17.

Prothorax as shown in figure 169BB; about four times as long as maximum height in lateral view. Median longitudinal ridge of mesonotum, and metanotum indistinct. Relative lengths of pronotum, mesonotum, and metanotum dorsally, 1/0.7/0.55.

Forelegs as shown in figure 169BB. Coxa considerably longer than pronotum. Femur about 15 times as long as wide. Distance of basal process of fore femur from base of article equal to about three times length of process. Posteroventral series composed of one long basal, four or five medium-sized, and about 40 very small, processes. Anteroventral series interrupted at base, composed of about four medium-sized and about 35 small processes; process situated basad of interruption inserted distad of level of large basal process of posteroventral series. Tibia slightly shorter than half of length of femur; tarsus one-third of length of tibia. Two subequal claws present. Femora of hind legs almost attaining apex of abdomen.

Abdomen slender, parallel-sided, about 20 times as long as maximum width. Eighth tergite distinctly wider than long (fig. 169DD), its posterolateral angles strongly salient; ninth tergite subhorizontal, strongly rugose longitudinally, its shape subtrapezoidal, shortly but conspicuously emarginated behind, in dorsal view about as long as eighth. Seventh sternite triangularly salient behind at center. Gonocoxites (fig. 169AA) with large, lateral, backwardly directed appendage, which is pointed apically and somewhat surpasses apex of lobe.

MATERIAL EXAMINED: Australia: New South Wales: Dorrigo (W. Heron; South Australian Museum), one female holotype.

OBSERVATIONS: This species is clearly related to *waratah* of Tasmania. It differs by its larger size and distinct color pattern, as well as by the morphological characters indicated in the key.

Pseudobargylia iuncea (Erichson)

Figure 169A–T

Emesa iuncea ERICHSON, 1842, p. 285.

Emesa juncea: DOHRN, 1860, p. 224, fig. 6.

Bargylia juncea: WYGODZINSKY, 1950c, p. 242, figs. 1–11.

Pseudobargylia iuncea: WYGODZINSKY, 1951b, p. 610.

In this species, the process of the anteroventral series inserted basad of the interruption is situated basad of the level of the basal process of the posteroventral series.

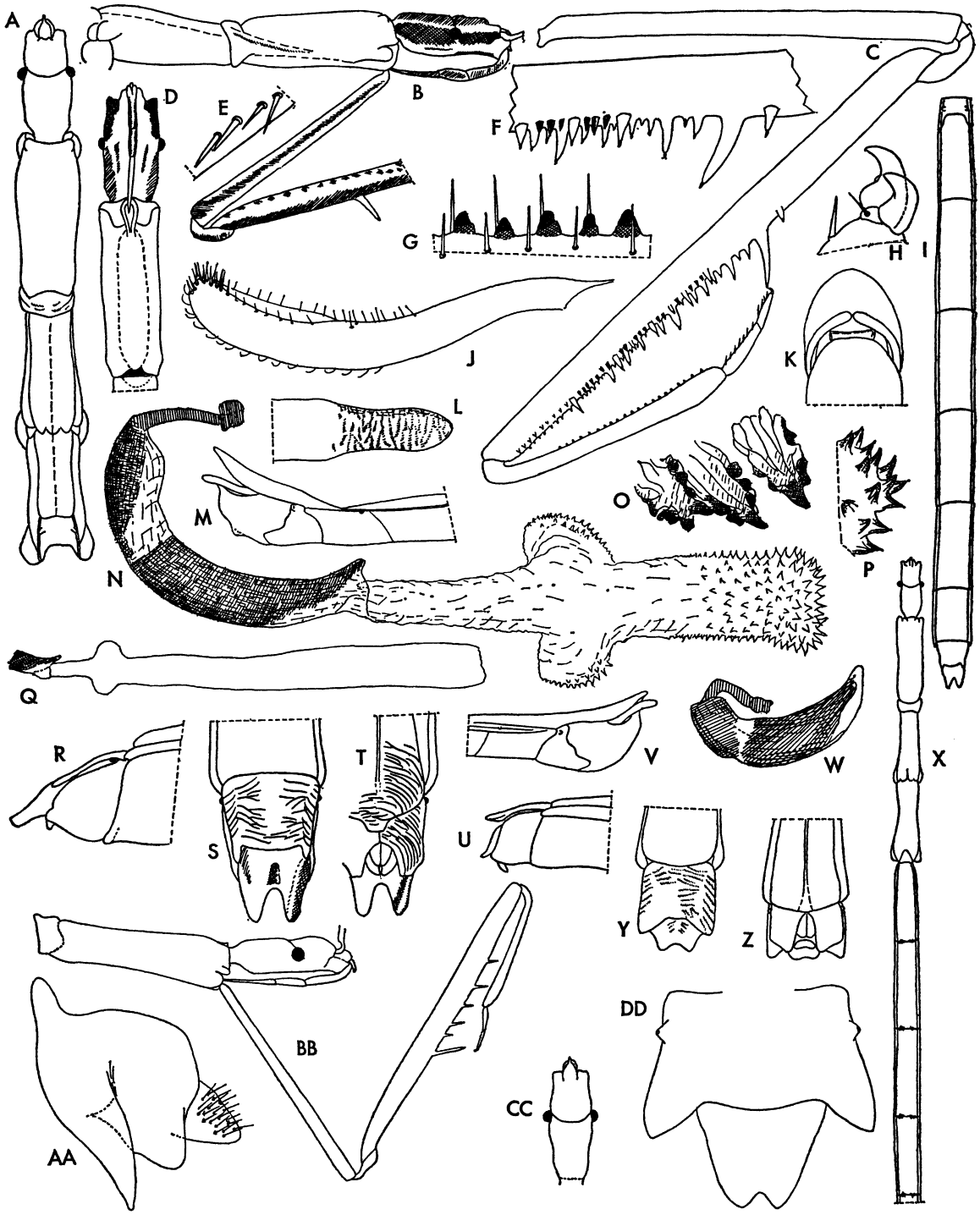
A female from South Australia examined agrees perfectly with the type from Tasmania redescribed by Wygodzinsky (1950c), but its pronotum is not carinate laterally on its posterior portion. The absence or presence of this carina is probably not a specific character.

The Tasmanian male here illustrated is smaller than the females examined (17 versus 20 mm.) but agrees with them in its narrow body and the relatively low pronotum

---

FIG. 168 (OPPOSITE PAGE). A–D. *Pseudobargylia brewarrina*, male. A. Anterior portion of body, seen from above. B. Pygophore, seen from behind. C. Genital region, side view. D. Paramere. E–R. *Pseudobargylia leai*. E. Genital region of male, ventral view. F. Pygophore, seen from behind. G. Apex of abdomen of male, side view. H. Apex of abdomen of female, seen from above. I. Phallus, side view. J. Praetarsus and claws of foreleg. K. Paramere. L. Apex of abdomen of female, seen from below. M. Syngonapophysis. N. Posterior gonapophysis. O. Genital region of female, seen from behind. P. Eighth and ninth tergites of female, as seen on slide mount. Q. Gonocoxite with gonapophysis. R. Genital region of female, lateral aspect. S–U. *Pseudobargylia marsupialis*, male. S. Head, seen from above. T. Anterior portion of body, side view. U. Apex of abdomen, seen from above. V–Y. *Pseudobargylia revoluta*, male. V. Anterior portion of body, dorsal view. W. Outlines of abdomen. X. Seta of posterior femur. Y. Anterior portion of body, lateral view. Z, AA–CC. *Pseudobargylia marsupialis*, male. Z. Thorax, seen from above. AA. Paramere. BB. Genital region, seen from behind. CC. Apex of abdomen, side view. DD–HH. *Pseudobargylia revoluta*, male. DD. Paramere. EE. Genital region, seen from behind. FF. Apex of abdomen, dorsal view. GG. Genital region, side view. HH. Phallus, lateral aspect.

Symbols: GON, gonapophysis; ST VIII, gonocoxite; SYNG, syngonapophysis; TG VIII, eighth tergite; TG IX, ninth tergite.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD

(fig. 169B). The genital region and organs (fig. 169J–Q) are comparable to those of *waratah* described below but differ by the very short posterior process of the pygophore, the longer and more slender parameres, and the shorter apical projection of the phallosoma. It has been possible to achieve complete extrusion of the phallosoma (fig. 169N–Q); it is densely beset with peculiar spinelike processes.

MATERIAL EXAMINED: *South Australia:* Murray Bridge (H. M. Hale; South Australian Museum), one female. *Tasmania:* Hobart (Lea; South Australian Museum), one male.

DISTRIBUTION: Tasmania; Southern Australia.

TYPE: Female, Zoologisches Museum der Universität Berlin.

Pseudobargylia leai Wygodzinsky

Figure 168E–R

Pseudobargylia leai WYGODZINSKY, 1956, p. 202, figs. 47–59.

The process inserted basad of the interruption of the anteroventral series of the fore femur is situated apicad of the level of the large basal process of the posteroventral series.

This insular species is characterized, along with many other features, by its strongly modified female genitalia. The original figures of the female genitalia are here reproduced and supplemented by a drawing of the abdominal apex as seen from behind (fig. 168 O) and several others showing the different genital sclerites as seen on slide mounts (fig. 168M, N, P, Q). The conspicuously downwardly directed, apical, spinelike projections of the syngonapophysis are especially noteworthy.

The phallus has been examined in more detail. The endosoma (fig. 168I) is similar to, though not identical with, that of *revoluta* described below (fig. 168HH), viz., entirely membranous and lacking toothlike spines, but provided with various large membranous projections.

MATERIAL EXAMINED: Lord Howe Island, on *Kentia* (A. M. Lea; South Australian Museum), one male, one female, five nymphs.

TYPE: Male, Museum Zoologicum Universitatis.

Pseudobargylia marsupialis, new species

Figure 168S–U, Z, AA–CC

DESCRIPTION: Male: Length, 12.4 mm.; head, 1.2; thorax, 4.0; abdomen, 7.2 mm.

General color testaceous; sides of head and thorax darker; abdomen dorsally with three narrow, longitudinal, reddish lines; ventral surface of abdomen faintly mottled with dark. Ventral surface of head yellowish white. Rostrum and appendages testaceous. Forelegs with very faint darker pigment. Mid and hind femora with faint, subapical, darker annulus, extreme apex stramineous; mid and hind tibiae with three darker and not very distinct annuli on basal third, apical third darker brown. Surface of body smooth, sparsely and delicately tuberculate.

Shape of head and rostrum as shown in

FIG. 169 (OPPOSITE PAGE). A–T. *Pseudobargylia iuncea.* A. Head and thorax, dorsal view. B. Anterior portion of body, lateral view; pattern shown on head and legs. C. Foreleg. D. Head and prothorax, ventral aspect; head with color pattern. E. Spiniform setae of under surface of fore tarsus. F. Base of series of fore femur. G. Detail of under surface of fore tibia. H. Praetarsus of foreleg with claws. I. Abdomen of female, dorsal view. J. Paramere. K. Genital region of male, posterior view. L. Seventh tergite of male. M. Apical portion of abdomen of male, lateral aspect. N. Phallus, lateral view; endosoma partially everted. O, P. Spiculae of endosoma, high magnification. Q. Apex of phallosoma, with endosoma fully everted, schematic. R. Genital region of female, lateral aspect. S. Apex of abdomen of female, seen from above. T. Genital region of female, ventral view. U–Z. *Pseudobargylia brunneri.* U. Genital region of female, lateral view. V. Genital region of male, lateral aspect. W. Phallus, side view. X. Head, thorax, and anterior portion of abdomen, seen from above. Y. Apex of abdomen of female, dorsal view. Z. Genital region of female, genital aspect. AA–DD. *Pseudobargylia involucrata,* female. AA. Gonocoxite with gonapophysis. BB. Anterior portion of body, lateral view. CC. Head, from above. DD. Eighth and ninth tergites, as seen on slide mount.

figure 168S, T; postocular region slightly narrowed posteriorly in dorsal view; interocular furrow carried backward behind level of posterior border of eyes; short, median, longitudinal sulcus before center of interocular furrow. Spine of labrum almost imperceptible. Length of first segment of antennae, 4.5 mm.; relatively length of segments, 1/0.7/0.065/?.

Thorax as shown in figure 168T, Z; posterior lobe rugose transversely, with distinct median, longitudinal carina; posterior lobe in lateral view about three times as long as maximum height. Mesonotum shorter than pronotum, metanotum still shorter, both together somewhat longer than pronotum. Faint median longitudinal carina on metanotum and on posterior region of mesonotum (fig. 168Z).

Forelegs as shown in figure 168T. Coxa slightly longer than pronotum. Femur about 12 times as long as maximum width. Distance of basal process from base of article equal to about four times length of process. Posteroventral series composed of one large basal process and about three small and 30 very small processes. Anteroventral series interrupted at base, process inserted basad of interruption situated basad of level of large basal process of posteroventral series. Tibia distinctly shorter than half of length of femur; tarsus one-third as long as tibia. Hind femora not quite attaining apex of abdomen.

Abdomen slender, sides subparallel, about 14 times as long as wide. Genital region as shown in figure 168U, BB, CC. Last tergite completely covering pygophore, narrowly tongue-shaped, slightly constricted before apex and again behind base, somewhat upwardly directed apically, transversely rugose. Eighth sternite emarginated at center behind as usual in genus; its lateral borders regularly emarginated. Pygophore rather elongated in lateral view, its posterior portion triangularly salient, narrow and pointed at apex. Parameres slender on basal two-thirds, rather abruptly bent on apical third and conspicuously and abruptly widened at this region; their exact shape and chaetotaxy as shown in figure 168AA. Phallosoma similar to that of *leai*, viz., with lateral chitinized area not interrupted subbasally; endosoma lacking toothlike spines, saclike when everted.

MATERIAL EXAMINED: South Australia: Kangaroo Island (South Australian Museum), one male holotype.

OBSERVATIONS: *Pseudobargylia marsupialis* differs from similar species as indicated in the key.

Pseudobargylia revoluta, new species

Figure 168V–Y, DD–HH

DESCRIPTION: Male: Length, 19 mm.; head, 1.3; thorax, 5.7; abdomen, 12 mm.

General color testaceous; head and thorax fuscous laterally, head whitish below. Abdomen darkened ventrally, on dorsal surface with delicate, dark, longitudinal lines. Clypeus and labrum stramineous; rostrum, antennae, and legs luteous. First antennal segment with wide, subapical, fuscous annulus, extreme apex whitish, apex of second segment, as well as third and fourth segments entirely, piceous. Fore coxa and femur faintly mottled with darker; tibia with three distinct dark annuli: one subbasal, one submedian, and one apical, last widest; tarsus clear-colored at base, dark on apical half. Mid and hind legs with extensive but faint dark annuli. Surface of body delicately but distinctly tuberculate-rugose.

Head and rostrum as shown in figure 168V, Y; former strongly flattened, latter very slender. Labrum developed as distinct short spine. First segment of rostrum not attaining level of anterior border of eyes. Length of first segment of antennae, 8 mm.; relative length of segments, 1/0.85/0.02/0.32.

Thorax as shown in figure 168V, Y. Pronotum with posterior lobe rugose transversely, distinctly detached, its posterior border somewhat salient in middle. Mesonotum shorter than pronotum, metanotum shortest, mesonotum and metanotum combined distinctly longer than pronotum. Mesonotum somewhat concave on posterior third; mesonotum and metanotum faintly carinate along middle longitudinally. Pronotum in lateral view five times as long as maximum height.

Forelegs as shown in figure 168Y. Coxa slightly longer than pronotum. Femur very slender, about 25 times as long as wide. Distance of basal process from base of article about five times length of process. Posteroventral series with one very long basal process and about four medium-sized, as well as

35 to 40 small to very small, processes. Anteroventral series interrupted at base, composed of four medium-sized and about 35 small processes. Process situated basad of interruption inserted basad of level of large process of posteroventral series. Tibia distinctly less than half as long as femur, with 30 to 35 short denticles. Tarsus one-half as long as tibia, claws subequal in size. Posterior femora not attaining apex of abdomen.

Abdomen almost parallel-sided, about 19 times as long as maximum width. Genital region of male as shown in figure 168EE–GG. Last tergite tongue-shaped, very narrow, almost horizontal, completely covering pygophore, strongly rugose transversely. Eighth sternite emarginated at center behind as usual, its sides with regular outlines. Pygophore with regular outlines in lateral view, its superior portion triangular, slender, almost pointed apically. Parameres touching at apices, strongly curved, their apical portion distinctly widened; their chaetotaxy as shown in figure 168DD. Phallus as shown in figure 168HH; phallosoma as usual for genus; everted endosoma saclike, with various membranous processes, lacking toothlike spines.

MATERIAL EXAMINED: Australia: Queensland: Maryborough (W. W. Fischer; South Australian Museum), one male holotype.

OBSERVATIONS: This species resembles *P. brunneri* and *P. brewarrina*. It differs from the former by the metanotum, which is shorter than the mesonotum, the much more slender fore femur, the regular outlines of the lateral borders of the eighth sternite, and the endosoma, which in *brunneri* bears minute teeth. *Revoluta* can be distinguished from *brewarrina* by the different shape of the postocular region of the head when seen from above, the different proportions of the mesonotum and metanotum, the more slender prothorax and fore femur, and the more elongate pygophore; the shape of the parameres seems also different.

Pseudobargylia waratah, new species

Figure 170A–V, X

DESCRIPTION: Length of male, 13; of female, 14.5–15.5 mm.; head (female), 14; thorax, 3.9; abdomen, 7.9 mm.

General color stramineous; intensity of markings highly variable. Head and thorax with dark, longitudinal band laterally, on dorsal surface with a median and 1+1 reddish sublateral lines; hind border of nota also more or less extensively reddish. Antennae testaceous; first segment with rather wide, fuscous, subapical annulus, extreme apex whitish. Forelegs stramineous; coxa with brownish spots of variable extension, femur with one apical, one basal, and three submedian fuscous annuli, spiniferous processes whitish; tibia with one narrow basal, a wide subbasal, and one wide subapical, fuscous annulus; tarsus light-colored at base, darker toward apex. Mid and hind femora with five to seven not invariably very distinct dark annuli, about as wide as, or slightly wider than, intervening light-colored regions; tibia with indistinct dark annuli, apices of tibiae and entire tarsi dark. Abdomen stramineous, hind borders of segments narrowly reddish, sides and dorsal surface with various reddish longitudinal lines; dorsum faintly mottled with darker, ventral surface in some cases equally mottled. Connexival segments with posterior three-fourths dark on dorsal surface; each tergite also with 1+1 dark spots at anterior margin.

Head and rostrum as shown in figure 170A, C; spine of labrum short, rounded apically, covering base of rostrum. Length of first segment of antennae, 6 mm.; relative length of segments, 1/0.75/0.085/?.

Thorax as shown in figure 170A, C. Pronotum not carinate laterally; its posterior lobe rugose transversely, distinctly detached from fore lobe. Prothorax distinctly less than three times as long as maximum height in lateral view (2.6–2.7/1). Mesonotum somewhat shorter than pronotum, metanotum shortest. Mesonotum and metanotum combined somewhat longer than pronotum; median longitudinal carina not distinct.

Forelegs as shown in figure 170B, C, F, G. Fore coxa somewhat longer than pronotum. Femur slender, about 15 times as long as wide. Distance of basal process of fore femur from base of article from two to three times length of process. Posteroventral series with one very large basal process and three or four medium-sized, and about 40 small to very small, processes. Anteroventral series composed of four medium-sized and 35 to 40 small processes; processes situated basad of basal interruption inserted basad of level of first process of posteroventral series. Tibia slightly

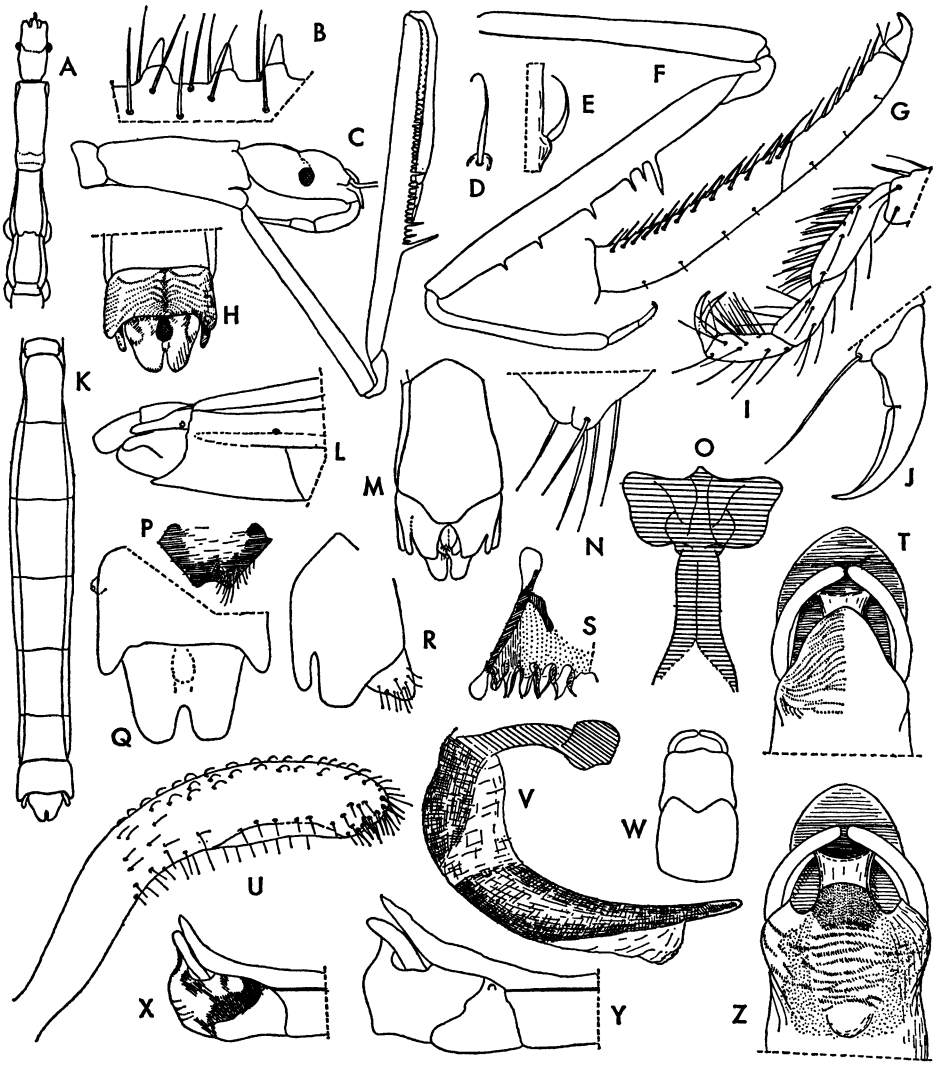


FIG. 170. A–V. *Pseudobargylia waratah*. A. Head and thorax of female, seen from above. B. Detail of under surface of fore tibia. C. Anterior portion of body of female, side view. D. Seta of sternite. E. Seta of posterior femur. F. Foreleg. G. Tarsus of foreleg. H. Genital region of female, dorsal view. I. Posterior tarsus. J. Claw of hind leg. K. Abdomen of female, seen from above. L. Apex of abdomen of female, side view. M. Genital region of female, seen from below. N. Apex of syngonapophysis, high mangification. O. Articulatory apparatus. P. Syngonapophysis. Q. Eighth and ninth tergites of female, as seen on slide mount. R. Gonocoxite and gonapophysis. S. Posterior gonapophysis. T. Genital region of male, posterior view. U. Paramere. V. Phallus, lateral view. W. *Pseudobargylia additita*, male, genital region, ventral aspect. X. *Pseudobargylia waratah*, male, apex of abdomen, lateral view. Y, Z. *Pseudobargylia additita*, male. Y. Apex of abdomen, lateral aspect. Z. Genital region, seen from behind.

less than half of length of femur, under surface with 32 to 35 denticles arranged in a single row. Tarsus one-third as long as tibia; claws subequal in size. Posterior femora not quite attaining tip of abdomen; modified setae of hind femur as shown in figure 170E. Posterior tarsus as shown in figure 170I.

Abdomen with sides subparallel, slightly widened on basal third and somewhat flaring at apex; abdominal length equal to seven times its maximum width.

Male: Genital region as shown in figure 170T, X. Last tergite tongue-shaped (much as in *iuncea*, see fig. 169L), rugose transversely, somewhat upwardly directed apically, completely covering pygophore. Eighth sternite emarginated at center behind, its lateral borders somewhat irregular. Pygophore as illustrated, delicately rugose transversely, its superior portion triangularly salient, lateral borders of salience continuous with rest of pygophore; apex of salience surmounted by medium-sized lamellar structure. Parameres meeting at apices, subcylindrical, somewhat excavated on inner surface before apex; their exact shape and chaetotaxy as shown in figure 170U. Phallus as shown in figure 170V; basal plates, in figure 170 O. General structure of endosoma like that of *iuncea* (see description above).

Female: Genital region as shown in figure 170H, L, M. Eighth tergite distinctly wider than long, its posterior angles salient, rounded apically. Ninth tergite subhorizontal, at least as long as eighth in dorsal view, disc anteriorly at center with distinct depression, its posterior border with narrow incision. Seventh sternite with median, apically truncate projection; gonocoxites with apically rounded lateral projection not attaining level of apex of lobe (fig. 170R). Posterior gonapophysis as shown in figure 170S; syngonapophysis, in figure 170P, its apex with a short projection.

MATERIAL EXAMINED: Tasmania: Waratah (Lea; South Australian Museum), one female holotype, one female paratype, one male allotype; Magnet (South Australian Museum), one female.

OBSERVATIONS: *Pseudobargylia waratah* is obviously closely related to the other Tasmanian species, *P. iuncea*. Very similar to it in general aspect and coloring, it differs from *iuncea* by the relatively shorter and wider abdomen, and in the female, by the peculiar lateral appendages of the gonocoxites and the differently shaped eighth and ninth tergites; the male differs from that considered to belong to *iuncea* also by the differently shaped pygophore and the somewhat shorter parameres.

Pseudobargylia spp.

Several nymphs of *Pseudobargylia*, representing the third to fifth instars, have been examined; all have a two-segmented tarsus as in the adult.

MATERIAL EXAMINED: *Tasmania:* Mt. Wellington (Lea; South Australian Museum), one specimen; Victoria: Ferntree Valley, January 1, 1951, floor of eucalyptus forest (W. L. Brown; South Australian Museum), one specimen.

PSEUDOMETAPTERUS, NEW GENUS

Metapterus AUCT (part).

DESCRIPTION: Macropterous, micropterous, or apterous. Medium-sized insects (10.5–15.5 mm.).

Body surface dull, not granulated. Setae sparse; modified setae pointed or rounded apically. General color testaceous to piceous, legs frequently annulated; conspicuous markings absent.

Macropterous form: Head moderately elongate, subrectangular, anteocular about as long as postocular region, sides of latter subparallel in dorsal view, only very slightly convergent posteriorly, rather abruptly constricted at neck; sides very rarely strongly converging posteriorly. Clypeus with or without, labrum invariably with, spinelike projection. Eyes small to medium-sized; interocular furrow not surpassing level of posterior border of eyes in dorsal view. Rostrum straight, segments not conspicuously thickened; first segment not reaching level of anterior border of eyes, second as long as, or slightly shorter than, first; third about as long as first. Antennae inserted near apex of head.

Pronotum covering mesonotum completely. Fore lobe subcylindrical, slightly narrowed posteriorly; posterior lobe with sides subparallel, in some cases with median, longitudinal carina.

Forelegs moderately stout to delicate. Femora from parallel-sided to moderately widened at middle, spined portion covering from three-fifths to five-sixths of length of article. Posteroventral series as usual, processes reduced to very small teeth on apical portion of article. Anteroventral series interrupted at base, small process situated basad of interruption inserted slightly distad of level of large, basal process of posteroventral series. Fore tibia from one-third to one-half of length of femur, ventrally with one or two irregular series of short, simple denticles. Fore tarsus about one-half as long as tibia, ventrally with one or two irregular series of deflexed spiniform setae. One large and one very small claw, former with medially incised, ventral lamella. Tarsi of mid and hind legs from stout to slender, with long setae in moderate number; first and third segments subequal in size, second smaller; claws slender, moderately curved, with submedian, pointed projection, rarely with additional smaller projection basad of larger one.

Forewings attaining about three-fifths of length of abdomen, with discal and subbasal cell, latter subdivided, in some cases slightly longer than distance between base of discal cell and place of insertion of Pcu on cell, measured along Cu. Pterostigma falling short of wing tip. Hind wings as long as forewings. Hamus gradually approaching and then joining Sc+R. M-cu cross vein absent. M meeting Cu basad of level of caesura, fused to Cu for considerable distance. R+M and Cu projecting beyond level of cross vein to wing border; R+M forked beyond middle, apical branch of Cu in some cases connected to distal portion of M. Anal lobe two-thirds as long as wing.

Abdomen parallel-sided to slightly fusiform, keeled below on most segments. Genitalia of both sexes not elevated in relation to longitudinal axis of abdomen.

Male: Last tergite tongue-shaped, attaining or surpassing apex of pygophore. Eighth sternite fully exposed, large, emarginated at center behind. Pygophore slightly compressed laterally, from subrectangular to almost subsemicircular in lateral view, inferoposterior angle from slightly to very conspicuously salient. Process of upper posterior border of pygophore slender, spinelike when seen from behind, shortly triangular, spinelike or subrectangular, with apex truncate or rounded in lateral view. Parameres medium-sized, more or less rod-shaped, rarely somewhat widened apically, with simple setae only. Phallus of normal size, very simple in structure, symmetrical. Basal plates fused. A large or small basal portion of phallobase membranous above and at sides, narrowly sclerotized below; remaining part cylindrical, completely sclerotized, diagonally truncate at apex, opening of phallobase directed backward (in one species, sclerotized portion of phallobase with elongate, backwardly directed projection, and opening of phallobase situated below base of projection). Endosoma membranous, without denticles or sclerotized portions; when everted, simply cylindrical or bladderlike.

Female: Eighth tergite large, generally longer than wide, emarginated or incised at apex, subhorizontal. Ninth tergite very small, vertical, inserted cephalad of apex of eighth tergite, invisible from above. Gonocoxites and gonapophyses separated. Syngonapophysis emarginated apically, its posterior angles rounded.

Micropterous form: General characters like those of winged form. Pronotum subcylindrical, its hind lobe distinct, covering extreme base of mesonotum only; mesonotum shorter than pronotum, metanotum shortest, from subquadrate to not more than three times as long as wide. Mesonotum and metanotum with tiny but distinct narrow wing pads. Abdomen from slightly to conspicuously fusiform.

Apterous form: Like the micropterous form, but without distinct wing pads.

TYPE SPECIES: *Ghilianella argentina* Berg.

ETYMOLOGY: *Pseudo*, and *Metapterus*, a genus of the Emesinae.

DISTRIBUTION: Nearctic and Neotropical regions; Araucanian subregion.

OBSERVATIONS: This new genus contains part of the New World species previously included in *Metapterus*. The general aspect of the insects is very similar to that of the North American *Barce*; both occur sympatrically in the southern United States. The very differently constructed phalli in each group are sufficient to justify the creation of the new genus. The differences in the structure of the

claws of the mid and hind legs and the apparently insignificant but remarkably constant difference in the position of the basal process of the anteroventral series of the fore femur add weight to this decision. The two latter characters make it also possible to identify generically the females in this complex and to place males without need for dissection. The phallus of the male is not unlike that of the European *Metapterus*, but the endosoma is spined in the latter genus, and the claws of its mid and hind legs lack the processes found in *Pseudometapterus*.

Several species groups can be recognized in *Pseudometapterus*. The largest, the *argentinus* group, is composed mostly of southern South American species: *argentinus*, *carioca*, *docilis*, *fluminensis*, *frutillarensis*, *oswaldocruzi*, and *rosascostai*; but I have also seen one undescribed species from Panama. Many of these species are very similar and may prove to be geographical races only. The group is characterized by the endosoma which is cylindrical when everted, the laminate process of the pygophore, the extension of the spined region of the fore femur which occupies slightly more than half of the length of the segment, and the relatively short metanotum of the micropterous form. The species are either fully winged or possess winged and micropterous forms. The *argentinus* group reaches the forest region of southern Chile with one species (*frutillarensis*), the only native emesine bug of the continental portion of the Araucanian subregion. The three native species of *Pseudometapterus* occurring on the insular portion of the Araucanian subregion, the Juan Fernández Islands (*addititius*, *kuscheli*, and *masatierrensis*), though related to the *argentinus* group, have no close affinities with any of its species. Each of these species is completely apterous, has a very stout body, a very large extension of the spined portion of the fore femur, and unique modifications of the color pattern of the head. Another species group, centered in the southern United States but occurring also south at least as far as Yucatan, includes the exclusively micropterous species *butleri*, *umbrosus*, and *wygodzinskyi*, and differs from the *argentinus* group by the invariably very slender body, the relatively more elongate metanotum, and, in particular, certain details of the male genitalia, such as the bladder-like endosoma, and the process of the pygophore which is roughly triangular in lateral view. The restricted area of this species group may indicate its former complete geographical isolation; none of the components of the other groups is sympatric with it even now. The last group is formed of a single highly aberrant species (*rossi*) found in the rain forests of eastern Peru (see description below). Though *rossi*, based on a winged male, is clearly the most divergent species of the whole assemblage, its relationships to the main stock of *Pseudometapterus* seem close enough to warrant its retention in the genus.

The following practical key takes only external characters into account and is not intended to reflect relationships.

KEY TO THE SPECIES OF *Pseudometapterus*

1. Head ventrally with a uniform or virtually uniform pale stripe which occupies entire interocular space; lateral piceous fascia entire (figs. 171B, L; 172B; 173B, C) . . . 2
   Ventral surface of head with conspicuous dark stripes and spots, or lateral dark fascia conspicuously interrupted behind eyes (figs. 171A, II; 172BB) 12
2. Clypeus with large spine (figs. 171B, L; 172B) 3
   Clypeus in some cases salient but invariably lacking spine (figs. 172 O; 173C) 9
3. Femora of mid and hind legs uniformly stramineous, in some cases slightly darkened toward apex 4
   Femora of mid and hind legs distinctly annulated 7
4. Micropterous forms (fig. 172D, K) 5
   Fully winged forms 6
5. Thorax relatively short and stout (fig. 171K); prothorax slightly less than four times as long as maximum height in lateral view (fig. 171L) . . . . . *frutillarensis*
   Thorax relatively long and slender (fig. 171D); prothorax distinctly more than four times as long as maximum height in lateral view (fig. 171B) . . . . . *argentinus*
6. Pronotum relatively long and slender (fig. 171J) . . . . . *fluminensis*
   Pronotum relatively short and stout (fig. 171C) . . . . . *argentinus*
7. Mid and hind legs piceous, femora and tibiae with very narrow, light-colored annuli . . . . . *rosascostai*
   Mid and hind legs stramineous, annulated with brown, apex of femora light-colored,

subapical annulus darker than remainder 8

8. Apex of second rostral segment considerably surpassing level of posterior border of eyes (fig. 172B); pygophore of male rather regularly rounded in lateral view (fig. 172H), its posterior process somewhat irregularly triangular in lateral view (fig. 171I), only micropterous form known, its metanotum twice as long as wide, as measured between carinae limiting its disc (fig. 172A) . *butleri*

Apex of second rostral segment not conspicuously surpassing level of posterior border of eyes; pygophore of male pointed at inferoposterior angle (as shown in fig. 171 O); its posterior process lamellar, rounded-truncate apically (as shown in fig. 171AA); winged and micropterous forms known, metanotum of latter 1.5 times as long as wide . . . . . *docilis*

9. Postocular region with sides very strongly convergent posteriorly in dorsal view (fig. 173A, B) . . . . . *rossi*

Postocular region of head with sides subparallel, only slightly converging posteriorly (fig. 172N) 10

10. Apex of second rostral segment considerably surpassing level of posterior border of eyes (fig. 172 O); pygophore of male rather regularly rounded in lateral view; only micropterous form known, its metanotum very narrow, more than three times as long as wide (fig. 172N) . . . . . *wygodzinskyi*

Apex of second rostral segment attaining but not surpassing level of posterior border of eyes; pygophore of male angulate at lower posterior border in lateral view; only winged forms known 11

11. Forewings uniformly grayish brown; seventh sternite of female (only sex known) salient behind, with distinct, short projection at middle (fig. 171JJ) . . . . *oswaldocruzi*

Discal cell of forewings with small dark spots arranged in longitudinal series; seventh sternite of female salient behind, but lacking median projection . . . . . *carioca*

12. Micropterous or apterous; fore femur less than 20 times as long as wide; process of male pygophore pointed or rounded apically in lateral view 13

Winged; fore femur very slender, much more than 20 times as long as maximum width; process of male pygophore truncate apically in lateral view . . . . . *obtusus*

13. Metanotum very narrow, more than three times as long as wide (as shown in fig. 172N); distance from base of fore femur to insertion of large basal process of posteroventral series about four times as long as process . . . . . *umbrosus*

Metanotum not distinctly longer than wide; distance from base of fore femur to insertion of large basal process equal to about twice length of process (fig. 171A) 14

14. Lateral piceous fascia of head widely interrupted behind eyes (fig. 171A). . *adititius*

Lateral dark fascia of head not interrupted 15

15. Fore femur annulated with dark and light; seventh sternite of female extending to apex of abdomen, covering genitalia from below, eighth tergite subrectangular, its apical emargination wide; parameres of male subcylindrical, slightly narrowed toward apex . . . . . *kuscheli*

Fore femur striped longitudinally with light and dark; seventh sternite of female not reaching to apex of abdomen, eighth tergite long and slender, with very narrow incision apically; parameres of male laterally compressed, strongly widened apically (fig. 171GG) . . . . . *masatierrensis*

Pseudometapterus adititius (Wygodzinsky), new combination

Figure 171A

Metapterus adititius WYGODZINSKY, 1952b, p. 16, figs. 1–6.

The head and foreleg of this species are figured here again to illustrate some of the characters of the group of species restricted to Juan Fernández.

It is interesting to note that *Pseudometapterus*, represented on Masatierra by three distinctive species, has apparently not reached Masafuera, where Kuschel's intensive collecting failed to obtain a single specimen of this genus.

DISTRIBUTION: Juan Fernández Islands (Masatierra).

TYPE: Male, Universidad de Chile.

Pseudometapterus argentinus (Berg), new combination

Figure 171B–D, DD

Ghilianella argentina BERG, 1900, p. 189.
Metapterus argentinus: WYGODZINSKY, 1951c, p. 118, figs. 4–7.

This species is known from both the winged and micropterous forms. The lateral aspect of

the head and prothorax of a micropterous male is shown here for comparative purposes.

DISTRIBUTION: Argentina (Buenos Aires, Córdoba).

TYPE: Museo de La Plata.

Pseudometapterus butleri, new species

Figure 172A–M, Q, R, T–V

DESCRIPTION: Micropterous. Length of male, 13.5–14; of female, 14.5–15.5 mm.; head, 1.2; thorax, 4; abdomen, 8.8 mm.

General color stramineous to testaceous; lateral stripe of head and sides of thorax piceous. Ventral surface of head entirely whitish (fig. 172B); rostrum testaceous. Antennae castaneous, first segment distally with piceous annulus, extreme apex whitish. Dorsal surface of thorax and abdomen with 1+1 faint, longitudinal, submedian, dark stripes; 1+1 distinct dark spots sublaterally on anterior borders of abdominal tergites. Each connexival segment divided dorsally and ventrally into two dark and two light-colored regions. Ventral surface of abdomen mainly dark, lighter toward middle of segment. Forelegs testaceous; coxa striped with castaneous longitudinally, femur transversely banded with dark, tibia with one basal, one submedian, and one apical dark annulus, tarsus dark, its basal third whitish. Mid and hind legs testaceous, femur with about five very narrow, equidistant, flavescent annuli, intermediate spaces piceous on apical region of segment; tibiae with three narrow, light-colored annuli on basal half. Head and thorax dull, smooth, with very conspicuous, scale-like setae simulating small tubercles; abdomen delicately rugose-tuberculate above and below. Modified setae short, rounded apically (fig. 172M).

Head and rostrum as shown in figure 172A, B. Clypeal process very large compared with slender labral projection. Second segment of rostrum distinctly surpassing level of posterior border of eyes. Length of first segment of antennae of male, 5 mm.; relative size of segments, 1/0.85/0.03/0.3.

Thorax as shown in figure 172A. Wing pads of mesonotum and metanotum distinct. Thoracic segments elongate; metanotum two-thirds as long as mesonotum, twice as long as wide; median dorsal longitudinal ridge on entire metanotum and on posterior portion of mesonotum.

Forelegs as shown in figure 172C–E; femur about 10 times as long as maximum width, distinctly wider than coxa (fig. 172D); spined portion occupying three-fifths of total length of segment. Fore tarsus with two irregular rows of deflexed, spinelike setae; one large, strongly chitinized claw and one very small, weakly sclerotized claw present (fig. 172E). Mid and hind femora falling short of apex of abdomen by 1–1.5 mm.; mid and hind tarsi and claws as given in generic description and shown in figure 172F, G.

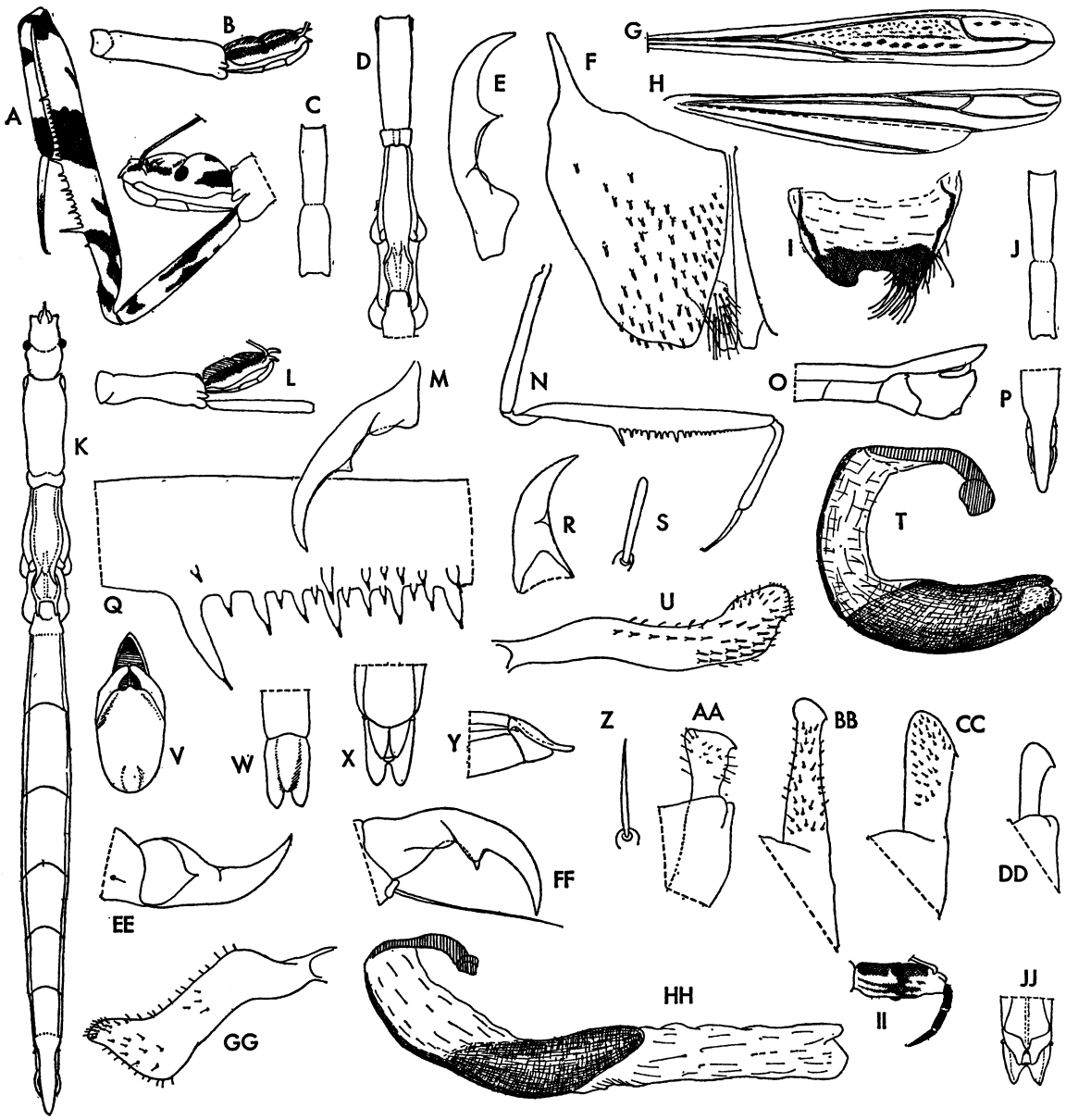
Abdomen slightly fusiform (fig. 172A).

Male: Last tergite tongue-shaped, completely covering genitalia from above, distinctly surpassing apex of pygophore (fig. 172H). Pygophore short, rather regularly rounded in lateral view (fig. 172H), its posterior process triangular when seen from behind (fig. 172J), irregularly triangular in lateral view (fig. 172I). Parameres curved, with short, simple bristles (fig. 172L). Phallus as shown in figure 172K; sclerotized portion of phallobase entire; endosoma bladder-like when everted.

Female: Genital region as shown in figure 172Q, R, U. Eighth tergite slightly longer than wide at base, conspicuously emarginated behind, its disc flat. Gonocoxites, gonapophyses, and syngonapophysis as shown in figure 172T, V.

MATERIAL EXAMINED: United States: Arizona: Santa Cruz County: 7 miles west of Nogales, November 20, 1955 (G. D. Butler and F. G. Werner; University of Arizona), one male holotype, one female allotype, three male and two female paratypes; (G. D. Butler and F. G. Werner; the American Museum of Natural History), one male paratype and one female paratype.

OBSERVATIONS: This species, which is named for one of its collectors, belongs to the *umbrosus* group characteristic of the southern United States. It differs from the more eastern *umbrosus* and *wygodzinskyi* by the presence of a clypeal spine, which is completely absent from the two other species, the different type of modified setae, details of the male genitalia, and the femur, which is not wider than the coxa in *wygodzinskyi* (fig. 172P).


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF
GG
HH
II
JJ

Pseudometapterus carioca (Wygodzinsky), new combination

Figure 171E

Metapterus carioca WYGODZINSKY, 1946a, p. 464, figs. 10–21.

The claws of the mid and hind legs of this species are very slender (fig. 171E).

DISTRIBUTION: Brazil (Rio de Janeiro).

TYPE: Male, Instituto de Ecologia e Experimentação Agrícolas.

Pseudometapterus docilis (Wygodzinsky), new combination

Metapterus docilis WYGODZINSKY, 1951c, p. 120, figs. 8–11.

MATERIAL EXAMINED: Argentina: Catamarca: Andalgalá, El Alamito, January, 1957 (Monrós; the American Museum of Natural History), one female; Tucumán: Tucumán, March 6, 1959, in spider web (A. Terán; Instituto Miguel Lillo), one male.

DISTRIBUTION: Argentina (from Jujuy and Chaco to Córdoba).

TYPE: Male, Instituto Miguel Lillo.

Pseudometapterus fluminensis (Wygodzinsky), new combination

Figure 171F–J

Metapterus fluminensis WYGODZINSKY, 1946a, p. 462, figs. 1–9.

This species is extremely close to the preceding which may be no more than a geographical race. The wings and some details of the female genitalia that have not been illustrated before are figured here.

DISTRIBUTION: Brazil (Rio de Janeiro).

TYPE: Male, Instituto de Ecologia e Experimentação Agrícolas.

Pseudometapterus frutillarensis, new species

Figure 171K–Y, AA

DESCRIPTION: Micropterous. Length of male, 10.5; of female, 11 mm.; male: head, 1.2; thorax, 2.7; abdomen, 6.6 mm.

Color of head and body rather uniformly ochraceous; clypeal spine, scalelike setae, and ridges of thorax whitish. Sides of head and thorax piceous; ventral surface of head uniformly stramineous. Rostrum and antennae uniformly ochraceous. Legs stramineous to ochraceous; forelegs very faintly striped or annulated with darker, annuli perfectly distinct on tibia only; femora and tibiae of mid and hind legs faintly darkened toward apex. Head and thorax smooth, dull, with numerous adpressed, scalelike setae. Abdomen delicately and irregularly tuberculate-rugose on dorsal and ventral surface.

Shape of head and rostrum as shown in figure 171K, L. Clypeal spine well developed, slightly larger than projection of labrum. Antennae bare in both sexes; length of first segment in male, 4.0; of second, 2.5 mm.

Thorax as shown in figure 171K, L. Pronotum subcylindrical, slightly less than four times as long as maximum height in lateral aspect. Mesonotum only slightly shorter than

---

FIG. 171 (OPPOSITE PAGE). A. *Pseudometapterus addititius*, male, anterior portion of body, side view, with color pattern. B–D. *Pseudometapterus argentinus*. B. Head and prothorax of micropterous male; color pattern shown on head. C. Pronotum of winged male, dorsal view. D. Thorax of micropterous male, dorsal view. E. *Pseudometapterus carioca*, claw of hind leg. F–J. *Pseudometapterus fluminensis*. F. Gonocoxite with gonapophysis. G. Forewing, with color pattern. H. Hind wing. I. Syngonapophysis. J. Pronotum of macropterous male, dorsal view. K–Y. *Pseudometapterus frutillarensis*. K. Male, general aspect. L. Anterior portion of body of male, lateral view. M. Claw of hind leg. N. Foreleg. O. Apical portion of abdomen of male, side view. P. Apex of abdomen of male, seen from above. Q. Base of series of fore femur. R. Claw of foreleg. S. Seta of posterior femur. T. Phallus, lateral view. U. Paramere. V. Genital region of male, seen from behind. W. Apex of abdomen of female, dorsal view. X. Genital region of female, ventral aspect. Y. Genital region of female, side view. Z. *Pseudometapterus masatierrensis*, seta of posterior femur. AA. *Pseudometapterus frutillarensis*, process of pygophore, lateral view, high magnification. BB. *Pseudometapterus kuscheli*, process of pygophore, lateral view. CC. *Pseudometapterus masatierrensis*, process of pygophore, lateral aspect. DD. *Pseudometapterus argentinus*, apex of pygophore, lateral view; setae not shown. EE–HH. *Pseudometapterus masatierrensis*, male. EE. Claws of foreleg. FF. Claw of hind leg. GG. Paramere. HH. Phallus, lateral view. II. *Pseudometapterus obtusus*, head, lateroventral view, with color pattern. JJ. *Pseudometapterus oswaldocruzi*, female, genital region, ventral view.

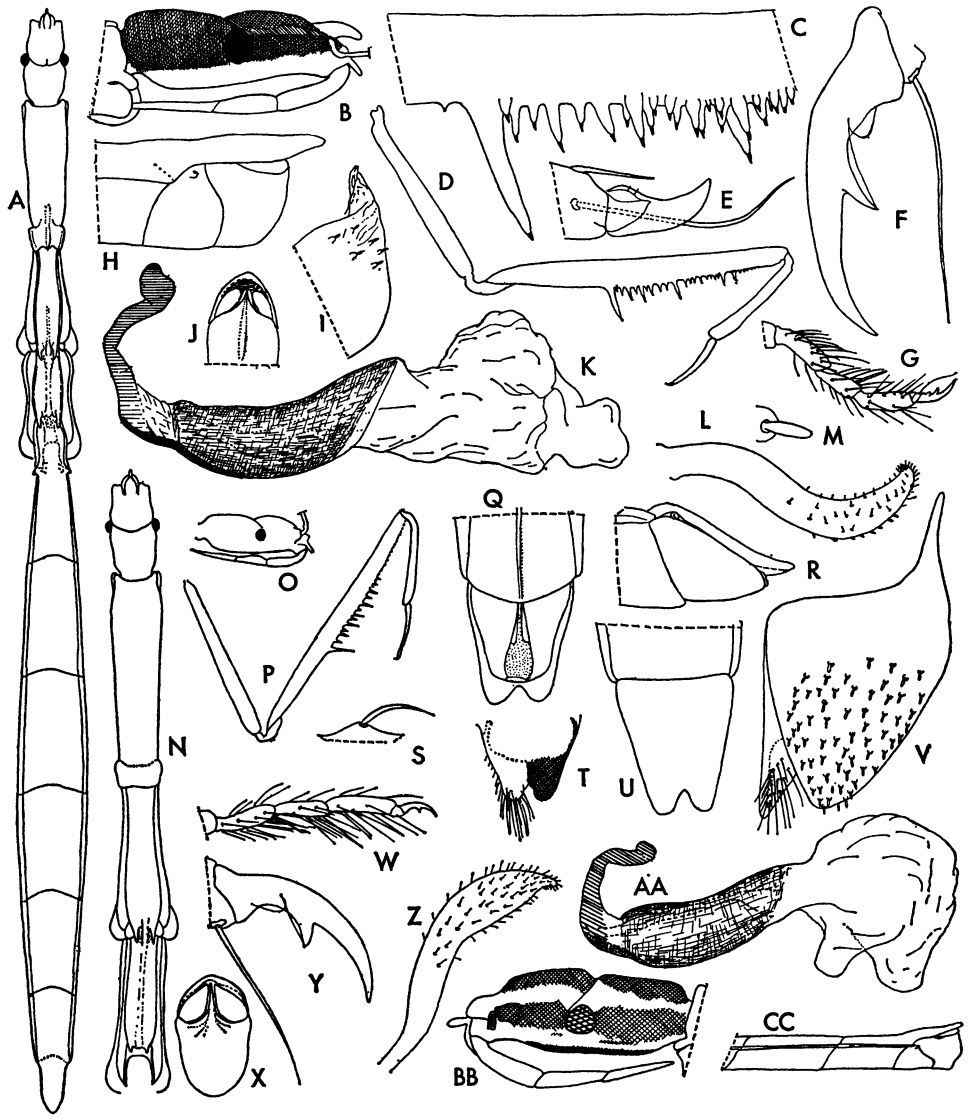


FIG. 172. A–M. *Pseudometapterus butleri*. A. Male, general aspect. B. Head, lateral view, with color pattern. C. Base of series of fore femur. D. Foreleg. E. Apex of fore tarsus, with claws. F. Claw of hind leg. G. Posterior tarsus. H. Apex of abdomen of male, lateral view. I. Apical half of pygophore, lateral view. J. Pygophore, seen from behind. K. Phallus, lateral view. L. Paramere. M. Seta of posterior femur. N–P. *Pseudometapterus wygodzinskyi*, male. N. Head and thorax, seen from above. O. Head, side view. P. Foreleg. Q, R. *Pseudometapterus butleri*, female. Q. Genital region, seen from below. R. Genital region, side view. S. *Pseudometapterus wygodzinskyi*, seta of posterior femur. T–V. *Pseudometapterus butleri*, female. T. Syngonapophysis. U. Last tergite, seen from above. V. Gonocoxite and gonapophysis. W–Z, AA. *Pseudometapterus wygodzinskyi*. W. Posterior tarsus. X. Pygophore, seen from behind. Y. Claw of hind leg. Z. Paramere. AA. Phallus, lateral view. BB, CC. *Pseudometapterus umbrosus*, male. BB. Head, lateral view, with color pattern. CC. Distal portion of abdomen, lateral view. (BB drawn by R. Hussey.)

pronotum, rather strongly elevated on disc behind, its wing pads slender, curved outward; median longitudinal ridge distinct before hind border only. Mesonotum very short, as long as wide, carinate along middle, its wing pads slightly shorter than those of mesonotum.

Forelegs as shown in figure 171N, Q. Femur 10 times as long as maximum width, spined portion occupying three-fifths of total length of article. One large and one extremely reduced claw (fig. 171R). Mid and hind legs short, posterior femora not attaining apex of abdomen, modified setae as shown in figure 171S.

Abdomen slightly fusiform, less widened in male (fig. 171K) than in female.

Male: Last tergite narrower than genitalia (fig. 171P), surpassing apex of pygophore (fig. 171 O). Shape of latter as shown in figure 171 O, V, subsemicircular in lateral view, but with inferoposterior angle distinctly salient. Process of posterosuperior border very slender, spiniform when seen from behind (fig. 171V), short and wide in lateral view (fig. 171AA), inserted slightly cephalad of posterior border of pygophore. Parameres rod-shaped, curved at apex, their exact form and chaetotaxy as shown in figure 171U. Phallus as shown in figure 171T; apical portion of phallobase at each side apically with irregularly shaped, membranous region.

Female: Genital region as shown in figure 171W–Y. Apical incision of eighth tergite wide and deep.

MATERIAL EXAMINED: Chile: Osorno: Frutillar, Largo Lanquihue, September 20, 1954 (Kuschel; the American Museum of Natural History), one male holotype, one female allotype.

OBSERVATIONS: This southernmost of all *Pseudometapterus* species is very close to *P. fluminensis* and *P. argentinus*. It differs from the micropterous form of the latter mainly by the shorter thoracic segments; the prothorax of *argentinus* is distinctly more than four times as long as maximum height, and the metanotum is longer (fig. 171B, D). The posterior process of the pygophore of the male of *argentinus* is also more slender in lateral view.

Pseudometapterus kuscheli (Wygodzinsky), new combination

Figure 171BB

Metapterus kuscheli WYGODZINSKY, 1951c, p. 126, figs. 34–43.

The posterior process of the male pygophore is illustrated.

DISTRIBUTION: Juan Fernández Islands (Masatierra).

TYPE: Male, Universidad de Chile.

Pseudometapterus masatierrensis (Wygodzinsky), new combination

Figure 171Z, CC, EE–HH

Metapterus masatierrensis WYGODZINSKY, 1951c, p. 124, figs. 24–33.

A few characters not considered in the original description are figured herein.

DISTRIBUTION: Juan Fernández Islands (Masatierra).

TYPE: Male, Universidad de Chile.

Pseudometapterus obtusus (Piza), new combination

Figure 171II

Metapterus obtusus PIZA, 1944, p. 135, figs. 1A, 1B, 2.

This is the only species from the American continent with conspicuous and extensive dark pattern on the ventral surface of the head (fig. 171II).

DISTRIBUTION: Brazil (São Paulo).

TYPE: Male, collection Piza.

Pseudometapterus oswaldocruzi (Wygodzinsky), new combination

Figure 171JJ

Metapterus oswaldocruzi WYGODZINSKY, 1946a, p. 468, figs. 25, 26.

The female of this species is characterized mainly by the median projection of the seventh sternite, as illustrated here.

DISTRIBUTION: Brazil (Mato Grosso).

TYPE: Female, Instituto Oswaldo Cruz.

Pseudometapterus rosascostai (Wygodzinsky), new combination

Metapterus rosascostai WYGODZINSKY, 1951c, p. 120, figs. 12–16.

DISTRIBUTION: Argentina (Tucumán).

TYPE: Male, Instituto Miguel Lillo.

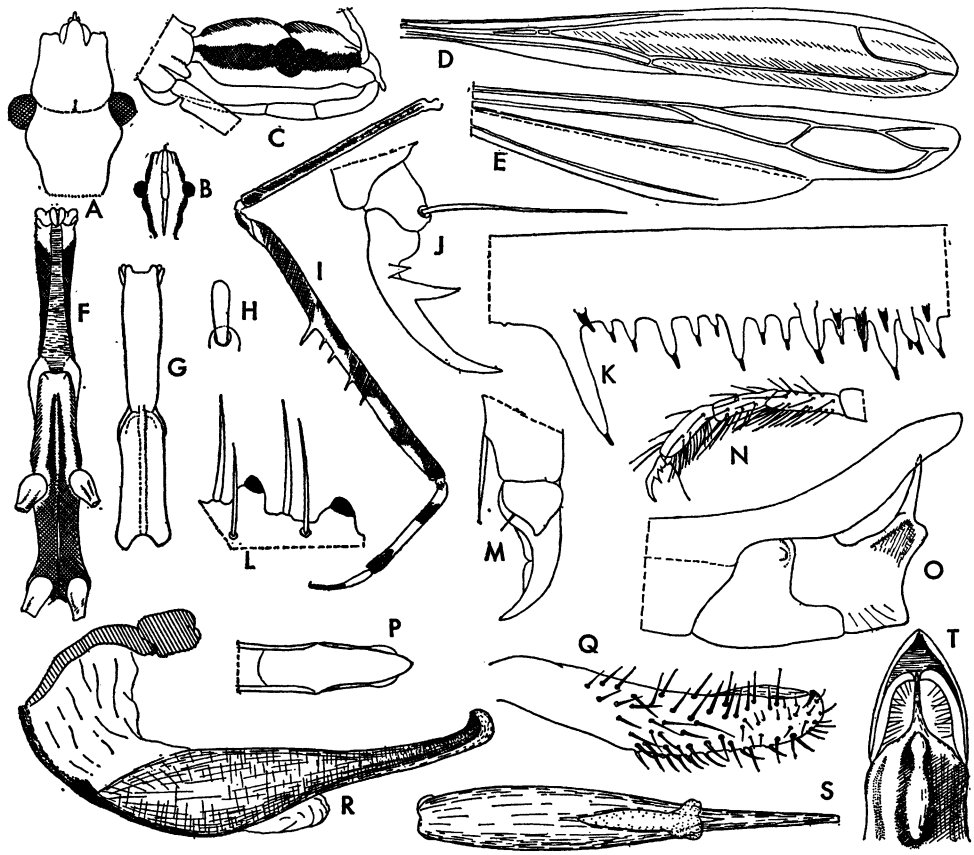


FIG. 173. *Pseudometapterus rossi*, male. A. Head, seen from above. B. Head, seen from below, with color pattern. C. Head, side view, with color pattern. D. Forewing, with color pattern. E. Hind wing. F. Thorax, ventral aspect, with color pattern. G. Pronotum, dorsal view. H. Seta of posterior femur. I. Foreleg, with color pattern. J. Praetarsus and claw of hind leg. K. Base of series of fore femur. L. Detail of under surface of fore tibia. M. Apex of fore tarsus, with claws. N. Posterior tarsus. O. Genital region, side view. P. Apex of abdomen, dorsal view. Q. Paramere. R. Phallus, lateral view. S. Phallosoma, ventral aspect. T. Genital region, seen from behind.

Pseudometapterus rossi, new species

Figures 7G; 173A–T

DESCRIPTION: Macropterous male: Length, 12.8 mm.; head, 1.2; thorax, 4.5; abdomen, 7.1 mm.

General color testaceous to stramineous; dorsal surface of head, of pronotum, and of abdomen darkened longitudinally at each side of midline. Sides of head and thorax piceous, dark region of mesopleura and metapleura with percurrent, longitudinal, flavescent line; ventral surface of head between eyes stramineous; rostrum testaceous; pattern of ventral surface of thorax as shown in figure 173F. First segment of antennae castaneous, piceous toward apex, with narrow whitish annulus distally; remaining segments testaceous. Forelegs stramineous, castaneous pattern as shown in figure 173I. Mid and hind legs testaceous; femora with narrow whitish annuli that become progressively wider toward apex; a wide subapical annulus piceous, a wide apical annulus whitish. Mid and hind tibiae castaneous on basal half, with three narrow whitish annuli. Forewings stramineous, with very faint, darker, longitudinal stripes. Abdomen dorsally with three longitudinal red lines; ventrally dark, mottled with yellowish. Pygophore ochraceous, with

2+2 irregular longitudinal stripes, apex of inferoposterior projection stramineous. Posterior process whitish at base, brown on apical two-thirds. Parameres stramineous, their apex brown. Head, fore lobe of pronotum, propleura and mesopleura, and sterna smooth, dull, with scalelike setae present but not conspicuous. Hind lobe of pronotum coarsely and irregularly rugose. Metathorax and abdomen delicately rugose, latter longitudinally rugose dorsally and delicately reticulate ventrally; last tergite coarsely rugose transversely. Modified setae short, rounded apically.

Head and rostrum as shown in figure 173A–C; sides of postocular region strongly convergent posteriorly, not abruptly constricted at neck. Eyes large. Clypeus lacking spine, that of labrum small. Second segment of rostrum slightly surpassing level of posterior border of eyes. Antennae bare; length of first segment, 6.7 mm.; relative length of segments, 1/0.8/0.02/0.35.

Thorax as shown in figure 173F, G. Hind lobe conspicuously carinate longitudinally along middle, deeply emarginated behind.

Forewings attaining three-fifths of length of abdomen, their venation as shown in figure 173D. Hind wings reaching apex of forewings, venation as shown in figure 173E.

Forelegs as shown in figure 173I, K–M. Femur slender, wider than coxa, about 20 times as long as wide, spined portion occupying three-fifths of total length of segment; spiniferous processes at base of series as shown in figure 173K. Denticles of tibia arranged in single series. Fore tarsus with two irregular series of deflexed, spinelike setae. One large and one very small claw, the former with a medially incised ventral lamella. Mid and hind legs relatively long and slender, posterior femora surpassing apex of abdomen by about 2 mm. Mid and hind tarsi slender (fig. 173N); claws only faintly curved, with one sharply pointed submedian process basad of which is a similar but much smaller additional process (probably homologous to rounded basal portion of medially incised ventral lamella of other species).

Abdomen slender, parallel-sided. Last tergite (fig. 173P) tongue-shaped, almost pointed apically, roof-shaped on distal portion, covering parameres and apex of posterosuperior process of pygophore from above, distinctly surpassing the latter. Pygophore (fig. 173 O, T) subrectangular in lateral view, carinate behind at middle, inferoposterior angle rectangular, posterior border emarginated, a distinct rounded projection below base of posterosuperior process, latter spine-shaped in lateral and posterior views. Parameres slightly curved at apex (fig. 173Q); their bristles long and numerous. Phallus as shown in figure 173R, S, sclerotized portion of phallobase projecting considerably beyond posteroventrally directed opening, curved upward at apex. Endosoma membranous, not examined in everted state.

MATERIAL EXAMINED: Peru: Yurac, 67 miles east of Tingo María, November 16, 1954 (E. I. Schlinger and E. S. Ross; the California Academy of Sciences), one male holotype; Yarimacocha, April 8–13, 1963 (L. E. Peña; the American Museum of Natural History), one male paratype.

OBSERVATIONS: As mentioned above, this new species, which is named for its collector, Dr. E. Ross, differs considerably from its congeners by such characters as the strongly converging sides of the postocular head, the presence of a small, additional, pointed process on the mid and hind claws, the peculiarly shaped phallus, and the long setae on the parameres.

Pseudometapterus umbrosus (Blatchley), new combination

Figure 172BB, CC

Metapterus umbrosus BLATCHLEY, 1926, pp. 553 [in key], 535.

Metapterus umbrorum (sic): WYGODZINSKY, 1951c, p. 116 [in keys].

This species is very closely allied to *M. wygodzinskyi* but differs at first glance by its dark, almost black color. The pale stripe beneath the head bears a median longitudinal dark line and is narrowed at each side behind the eyes (fig. 172BB). The male genital segments of both species are extremely similar (fig. 172CC).

Information obtained from Dr. R. Hussey, who examined the type and has seen several additional specimens, shows that Blatchley (1926) failed to mention the absence of a frontal spine between the antennae (fig. 172BB). The under surface of the head is not

fuscous brown but is as described above, the front coxae are distinctly shorter than the head plus the pronotum, and the legs, though very dark, have faint yellowish annuli, especially on the forelegs and tibiae of the mid and hind legs.

DISTRIBUTION: Southern United States (Florida).

TYPE: Purdue University.

Pseudometapterus wygodzinskyi (Elkins), new combination

Figure 172N–P, S, W–Z, AA

Metapterus wygodzinskyi ELKINS, 1953, p. 137, figs. 1–8.

This species is very close to *umbrosus* morphologically; *wygodzinskyi* differs from *umbrosus* mainly by the uniformly light-colored stripe on the under surface of the head, interrupted in *umbrosus*. A few of the characters of *wygodzinskyi* are illustrated here to facilitate comparisons with other species.

MATERIAL EXAMINED: Mexico: Yucatan: Xcanlol, Tekax, March 20, 1947 (M. Cardenas; United States National Museum), one male.

DISTRIBUTION: United States (Texas); Mexico (Yucatan).

TYPE: Male, United States National Museum.

SCHIDIUM BERGROTH

Schidium BERGROTH, 1916, p. 230.

Colasiella VILLIERS, 1948, p. 471 (new synonymy).

DESCRIPTION: Macropterous, micropterous, or apterous. Medium-sized to very large species (11.5–34 mm.).

Macropterous form: Body surface from smooth to delicately rugose, in no case shining or conspicuously tuberculate. Setae short and sparse; modified setae pointed or rounded apically. Coloring varied; either uniformly dark, or body and legs conspicuously spotted and mottled.

Head elongate, anteocular portion subrectangular, postocular with sides more or less undulate, distinctly converging posteriorly in dorsal view. Clypeus without process; labrum inconspicuous, rarely in shape of small cylindrical projection. Eyes medium-sized; interocular furrow not surpassing level of posterior border of eyes. Rostrum straight; first segment not more than one and one-half times length of second, reaching somewhat beyond middle of anteocular portion; third segment as long as, or slightly longer than, first. Antennae inserted near apex of head.

Pronotum not covering mesonotum. Prothorax subcylindrical, only faintly widened anteriorly; hind lobe of pronotum distinct, but very short, collar-like. Mesonotum shorter than pronotum, simple.

Forelegs from stout to very slender. Femora from parallel-sided to slightly widened; spined portion from two-fifths to three-fifths of total length of article, generally one-half. Posteroventral series beginning with elongate spiniferous process, followed by several medium-sized, interspersed with numerous small, processes, latter transformed into small denticles on apical portion of article. Anteroventral series composed of small and very small spiniferous processes; interrupted at base. Tibia from one-third to one-fourth as long as femur, its under surface with one row of small, strongly sclerotized, peglike denticles. Fore tarsus from one-half to two-thirds as long as tibia, not segmented, strongly chitinized, virtually bare above and at sides, ventrally with one row of deflexed, spiniform setae; claws from subequal to distinctly unequal in size, their under surface with medially incised, low lamella. Mid and hind legs slender, femora slightly surpassing apex of abdomen. Tarsi slender, under surface with simple bristles of moderate size and number; first and third segments subequal in size, second shorter. Claws slender, moderately curved, their under surface with medially incised, low lamella.

Forewings not extending much beyond level of center of abdomen, rarely to two-thirds or three-fourths of length of abdomen; discal and subbasal cell present, latter not subdivided, much longer than distance between base of discal cell and insertion of Pcu on cell as measured along Cu. Pterostigma falling short of wing tip. Hind wings as long as forewings. Hamus approaching and then joining Sc+R only gradually. M-cu cross vein absent; M meeting Cu much basad of caesura, fused to Cu for a large extension. R+M and Cu projecting beyond level of cross vein to near wing margin, not connected

to each other; R+M forked subapically. Anal lobe about four-fifths of wing length.

Abdomen with sides subparallel; keeled below on most segments. Genitalia of both sexes elevated in relation to longitudinal axis of abdomen or not.

Male: Seventh tergite slender, tongue-shaped, attaining or slightly surpassing apex of pygophore. Eighth sternite large, emarginated at center behind, longitudinally striate laterally. Pygophore large, very slightly compressed laterally, its outline varied, mostly irregular, rarely subsemicircular in lateral view; posterosuperior border prolonged into a conspicuous, upwardly directed, generally spiniform, and rarely triangular process. Parameres from rod-shaped to broadly spatulate, their inner surface with numerous variously arranged, strongly sclerotized, conical spinulets in addition to bristles. Phallus of normal size, symmetrical. Articulatory apparatus short and stout; basal plates fused. Basal plate struts fused into apically trifid, elongate, shieldlike structure. Phallosoma of irregular shape, largely membranous, distally on under surface frequently with 1+1 downwardly directed projections; opening of phallobase posterodorsally directed; phallosoma walls with delicate reticulate pattern. Endosoma occupying distal half of phallosoma, apparently not eversible, with one basal, unpaired, sclerotized region, and in most cases with additional paired or unpaired sclerotizations.

Female: Genitalia varied in shape, but eighth tergite invariably subhorizontal, large, with 1+1 lateral and in some cases median projection posteriorly; ninth tergite small, vertical, visible from above. Gonocoxites and gonapophyses separated. Syngonapophysis faintly emarginated behind.

Micropterous form: General characters like those of winged form. Thorax slender, mesonotum about as long as pronotum, metanotum as long as, or much shorter than, mesonotum. Minute wing pads on mesothorax and metathorax. Abdomen of female in some cases fusiform. Genitalia like those of winged form; shield formed by fused struts of phallus in some cases not trifid apically.

Apterous form: Like micropterous form, but without wing pads.

TYPE SPECIES: Of *Schidium*, *Schidium lemur* Bergroth (original designation); of *Colasiella*, *Ghilianella matercula* Bergroth (monobasic).

DISTRIBUTION: Ethiopian, Oriental, Australian and Palearctic regions.

No endemic species of *Schidium* are found in the Australian and Palearctic regions.

OBSERVATIONS: When Villiers (1948) described *Colasiella* he had not seen the type species of *Schidium* (*lemur* Bergroth) which is very closely related to, and certainly congeneric with, the type of *Colasiella* (*Ghilianella matercula*). Thus, *Colasiella* must be synonymized with *Schidium*.

The question remains whether the species included by Villiers (1948, 1949a) in *Schidium*, *sensu* Villiers, differ generically from *Schidium* Bergroth (= *Colasiella* Villiers). Villiers (1949a) used the shape of the postocular region of the head for distinguishing the two groups as follows:

Lobe postérieur de la tête très fortement et régulièrement rétréci en arrière, ses cotés droits et convergents . . . . . [*Schidium* Bergroth, as *Colasiella* Villiers]

Cotés du lobe postérieur de la tête sinués, étranglés au milieu . . . [*Schidium*, *sensu* Villiers]

However, the condition described for *Colasiella* also applies to several species belonging undoubtedly to *Schidium*, *sensu* Villiers. On the other hand, it must be admitted that *lemur* and three closely related species (*alatum*, *kolleri*, and *matercula*) form a well-circumscribed natural group characterized by rather uniform dark color, very large slender bodies, with equally very elongated thoracic segments (fig. 177A), a generally wingless condition in both sexes, the fact that the male genitalia have strongly widened spatulate parameres (fig. 177M, Q, R), and the fact that the sclerite formed by the struts is not trifid (fig. 177 O, V). The female genitalia of at least two species in this apparently uniform group (fig. 177G, U) are quite dissimilar; however, similar very elongate thoracic segments are found in the quite unrelated *confinis* (fig. 175A), and spatulate parameres are a not uncommon occurrence in the assemblage (figs. 174S; 176V; 179U, V). We can conclude that, though *alatum*, *kolleri*, *lemur*, and *matercula* form a well-circumscribed group, it cannot be separated unequivocally from the rest of the species with which it is

compared. It is concluded that we have before us a single, though polymorphic, genus.

This polymorphism is especially evident in the structure of the genitalia. The shape of the pygophore is generally irregular, and the posterior process, though always well developed, varies considerably in shape; the process is long and slender only in the species around *lemur*. The phallus is as described above; the subapical projections of the phallobase vary considerably in size, direction, and shape, and may even be completely absent. The endosoma, though maintaining its general structure, shows considerable diversity in shape, and the number and form of its sclerotizations are subject to considerable variation. The female genitalia, though following the general description given above, are by no means uniform. The posterolateral angles of the eighth tergite are mostly pointed or triangularly salient, but in one group (*callipygum*, *hoberlandti*, *spatuliferum*) the posterolateral angles of the eighth tergite are extremely elongated, spatulate in shape, and projected backward and downward (fig. 174J). The center of the hind border of the eighth tergite may be simple or bear long or short projections. The small ninth tergite is generally simple in structure, but in certain species, for instance *matercula* (fig. 177U, X), its anterior border bears a short, upwardly directed salience overlying the center of the posterior margin of the eighth tergite.

Tropical Africa is the actual speciation center of *Schidium*. The extralimital species (*confinis*, *furtivum*, *pennatum*, and *marcidum*), though representing a peculiar line of specialization, are not so far removed morphologically from the main stock of the genus as to have doubts cast on their generic position. *Schidium confinis* is known from Formosa, *furtivum* and *pennatum* are limited to Java, and *marcidum* is widespread over the Oriental Region, even having reached Australia.

As in many other genera of the Emesinae, it is not always possible to correlate correctly the two sexes or morpha of a given species in *Schidium;* distributional data and characters of size and coloring sometimes show the way, even if only to demonstrate what cannot belong together. Possibly some of the species keyed out and enumerated or described below represent only the alternate sex or morph of a species named elsewhere.

KEY TO THE SPECIES OF *Schidium*

1. Macropterous 2
   Micropterous or apterous 27
2. Females 3
   Males 16
3. Eighth tergite posteriorly with three finger-like projections of about equal size and shape, one median and 1+1 lateral (fig. 179DD) . . . . . *marcidum*
   Eighth tergite different 4
4. Center of eighth tergite triangularly salient, posterolateral angles in shape of somewhat twisted, often downwardly bent projections (figs. 174I–L, V; 176DD, EE) 5
   Center of eighth tergite not salient behind; posterolateral angles only rarely as above (*hoberlandti:* fig. 174W), generally without type of projections mentioned 9
5. Posterolateral projections of eighth tergite much shorter than tergite proper (fig. 176EE) . . . . . *reflexum*
   Posterolateral projections of eighth tergite as long as, or longer than, tergite proper (fig. 174J, L, V) 6
6. Posterolateral projections of eighth tergite narrow, horizontal 7
   Posterolateral projections of eighth tergite wide, bent downward (fig. 174J, V) . . 8
7. Median lobe of eighth tergite subtriangular, pointed apically . . . . . *bamoun*
   Median lobe of eighth tergite semi-elliptical, rounded apically . . . . . *saegeri*
8. Center of hind margin of eighth tergite prolonged into elongate, conical process (fig. 174I, L) . . . . . *callipygum*
   Center of hind margin of eighth tergite in shape of wide-angled triangle (fig. 174V) . . . . . *spatuliferum*
9. Posterolateral projections of eighth tergite spatulate, directed backward and somewhat downward (fig. 174W) . . . . . *hoberlandti*
   Posterolateral projections of eighth tergite different 10
10. Posterolateral projections of eighth tergite triangularly salient 11
    Posterolateral projections of eighth tergite simulated by presence of shallow median emargination on straight posterior border of tergite . . . . . *kivuense*
11. Size, more than 20 mm.; eighth tergite much longer than wide 12
    Size, less than 20 mm.; eighth tergite rarely longer than wide 13

12. Fore femora testaceous, laterally with wide brown stripe, which becomes narrower and lighter-colored toward base; base of posterolateral projections of eighth tergite wider than base of emargination . . . . . *congoense*
    Fore femora testaceous, indistinctly marbled with brown; base of posterolateral projections of eighth tergite not wider than base of emargination . . . . . *ivorense*
13. Length, 16–18 mm. 14
    Length, 13–14 mm. 15
14. Posterolateral projections of eighth tergite longer than wide at base . . . . . *haugi*
    Posterolateral projections of eighth tergite not longer than wide at base . . . *assiniense*
15. Mid and hind femora and tibiae annulated with white; forewings testaceous, with brownish spots; apical emargination of eighth tergite shallow, occupying less than one-fifth of total length of tergite . . . . . *lamottei*
    Mid and hind femora and tibiae lacking white annuli; forewings milky white, with brown spots; apex of eighth tergite deeply emarginated, posterolateral projections large, triangular . . . . . *pelissieri*
16. Parameres slightly compressed, deeply notched dorsally at apical third (fig. 174T) . . . . . *calundo*
    Parameres not as above 17
17. Parameres rod-shaped, from slightly to strongly curved (figs. 174R; 178J) . . . 18
    Parameres flattened, gradually or abruptly widened beyond base (figs. 174S; 176M, V, GG; 179U) 21
18. Parameres straight on basal, strongly curved on apical, half (fig. 174R) . . *montanum*
    Parameres curved or bent at about middle, straight apically (fig. 178J) 19
19. Pygophore twice as long as high in lateral view . . . . . *haugi*
    Pygophore less than twice as long as high in lateral view (fig. 178N) 20
20. Size, 15 mm.; mesonotum with alternating black, tawny, and testaceous bands; white annuli of mid and hind legs wide; forewings attaining two-thirds of length of abdomen . . . . . *rubrolineatum*
    Size, 17 mm.; mesonotum uniformly castaneous; white annuli of mid and hind legs narrow; forewings attaining middle of abdomen only. . . . . *malkini*
21. Size, not more than 12 mm.; fore femur about 12 times as long as maximum width (fig. 176C); parameres abruptly widened before apex, widened portion subcircular (fig. 176M, GG) 22
    Size, 17 mm. or more; fore femur at least 18 times as long as maximum width; parameres more gradually widened toward apex, widened portion not subcircular (figs. 174S; 179U) 24
22. Under surface of pygophore uniformly rounded to base of process in lateral view . . . . . *bamoun*
    Under surface of pygophore not uniformly rounded, somewhat notched in lateral view (fig. 176L, M, GG, HH) 23
23. Pigment distribution of genital region as shown in figure 176M; posterior carina of pygophore narrow (fig. 176 O), process and its base almost straight behind in lateral view (fig. 176L) . . . . . *eboris*
    Pigment distribution of genital region as shown in figure 176GG; posterior carina of pygophore wide (fig. 176FF); process and its base curved in lateral view (fig. 176HH) . . . . . *adelphidion*
24. Length, more than 20 mm.; head with sides gradually converging posteriorly in dorsal view (as shown in fig. 177B); parameres large, subtriangular (much as shown in fig. 177Q) . . . . . *alatum*
    Length, 20 mm. or less; head constricted before neck in dorsal view (fig. 179B); parameres different 25
25. Fore lobe of pronotum very strongly narrowed, parallel-sided on posterior half, narrowest portion only half as wide as width of anterior portion; pronotum more than twice as long as head; spined part of fore femur occupying less than half of length of article; parameres only moderately widened apically, antennae brown, with several narrow white annuli . . . . . *strangulatum*
    Fore lobe of pronotum not more than twice as long as head, much less narrowed behind, narrowest portion at least three-fourths as wide as width of anterior region; spined part of fore femur occupying at least half of length of article; parameres conspicuously widened (figs. 174S; 179U); antennae lacking white annuli, with exception of, in some cases, on extreme apex of articles 26
26. Pronotum conspicuously constricted at middle in dorsal view; process of pygophore triangular when seen from behind; sensory spines of parameres occupying whole length of widened portion (fig. 174S) . . . . . *barrosmachadoi*
    Pronotum almost parallel-sided (fig. 179B); process of pygophore spinelike in posterior

view (fig. 179M); sensory spines of parameres restricted to apical portion of same (fig. 179U) . . . . . *marcidum*

27. Size large, more than 25 mm.; thoracic segments cylindrical, metanotum about as long as mesonotum (fig. 177A) 28
Size smaller, 25 mm. or less; metanotum generally much shorter than mesonotum (figs. 174B; 178S; 179A), only in *confinis* (fig. 175A) almost as long as mesonotum . .30

28. Head fuscous, with 1+1 sublateral and in some cases one median yellowish spot on postocular portion dorsally (fig. 177B); pronotum almost uniformly fuscous; spatulate portion of male parameres subtriangular (fig. 177M, Q) 29
Head flavous with four brown bands; pronotum brown, with a median longitudinal line flavous; male parameres approximately hatchet-shaped (fig. 177R) . . *kolleri*

29. Head relatively short (fig. 177B); posterolateral angles of eighth tergite of female subtriangular, pointed (fig. 177G); paramere of male not constricted subapically (fig. 177M) . . . . . *lemur*
Head relatively elongate and slender (fig. 177S); posterolateral angles of eighth tergite of female broadly rounded (fig. 177U); paramere of male distinctly constricted before apex (fig. 177Q) . . . . . *matercula*

30. Males 31
Females 39

31. Parameres distinctly widened apically (figs. 175N; 179V) 32
Parameres slender, rod-shaped. 37

32. Parameres broadly triangular in lateral view, completely filling space between pygophore and last tergite (fig. 179K) 33
Parameres more or less widened but not broadly triangular, not filling space between pygophore and last tergite 34

33. Paramere much longer than wide when *in situ* . . . . . *marcidum*
Paramere not longer than wide when *in situ* . . . . . *meruensis*

34. Size, 23.5 mm.; color almost uniformly castaneous, anterior portion of head, sides of thorax and of abdomen black; pygophore regularly subsemicircular in lateral view . . . . . *spatuliferum*
Size, less than 20 mm.; color lighter, not as above; posterior border of pygophore somewhat notched in lateral view 35

35. Parameres abruptly widened apically, widened portion subcircular (as shown in fig. 176M, GG) . . . . . *bamoun*
Parameres not subcircularly widened apically 36

36. Size, 11 mm.; labrum not projected; metanotum much shorter than mesonotum; under surfaces of seventh and eighth sternites forming continuous outline in lateral view; parameres considerably surpassing posterior border of pygophore, their basal two-thirds slender, their apical third strongly and abruptly widened . . . . . *carayoni*
Size, 17–18 mm.; labrum in shape of small, cylindrical projection (fig. 175B); under surfaces of seventh and eighth sternites not forming continuous outline in lateral view (fig. 175I); parameres not distinctly surpassing posterior border of pygophore, only gradually widened toward apex (figs. 175I, M) . . . . . *confinis*

37. Dorsal surface of abdomen concolorous . .38
Dorsal surface of abdomen brown, densely spotted with yellowish . . . . . *nutricola*

38. Dorsal surface of head and pronotum piceous . . . . . *cottesi*
Dorsal surface of head and pronotum light yellowish . . . . . *koba*

39. Eighth tergite posterolaterally with 1+1 elongate, spatulate, backwardly and downwardly directed, somewhat twisted projections (fig. 174I–L); size, about 25 mm. . . . . *callipygum*
Posterolateral angles of eighth tergite different; size, less than 25 mm. 40

40. Spined portion of fore femur occupying three-fifths of total length of article 41
Spined portion of fore femur occupying only one-half of total length of article or only very slightly more 43

41. Eighth tergite with 1+1 posterolateral projections 42
Eighth tergite without posterolateral projections . . . . . *oldeaniensis*

42. Length, 12.5 mm.; general color pale yellow; eighth tergite posteriorly with one median and 1+1 lateral, elongate, pointed projections . . . . . *tibbu*
Length, 16 mm.; general color blackish; eighth tergite posteriorly straight across at middle, with 1+1 lateral triangular projections . . . . . *marmoratum*

43. Median portion of posterior border of eighth tergite emarginated or straight across, lacking median projection 44
Center of posterior border of eighth tergite with a distinct projection 50

44. Sides of fore femur concolorous or with faint pattern elements only 45
Sides of fore femora with conspicuous pattern elements 46

45. Eighth tergite wider than long . . . *koba*
Eighth tergite longer than wide . *loangoense*
46. Posterolateral angles of eighth tergite each with a short, twisted, lamellar process . . . . . *carayoni*
Posterolateral angles of eighth tergite lacking such processes 47
47. General color dark brown to blackish; eighth tergite with sides distinctly converging posteriorly (figs. 174U; 178DD) 48
General color yellowish brown; eighth tergite wider across apices of distal projections than at base . . . . . *nutricola*
48. Posterior border of eighth tergite with regularly rounded or angular emargination (fig. 174U) 49
Posterior border of eighth tergite only slightly convex between posterolateral processes (fig. 178DD) . . . . . *malkini*
49. Head and pronotum with clearly defined, dark, pattern elements; mesonotum with filiform wing pads, metanotum with strongly salient, pointed posterior angles; posterior border of eighth tergite with regularly rounded emargination . . . . . *schoutedeni*
Head and pronotum with pattern elements not clearly defined; mesonotum lacking wing pads, metanotum lacking strongly salient, posterolateral angles; posterior border of eighth tergite angularly emarginated (fig. 174U) . . . . . *rivale*
50. Labrum in shape of small but distinct projection (fig. 175B); metanotum almost as long as mesonotum, more than four times as long as wide (fig. 175A); ninth tergite not rounded apically (fig. 175R, U) . . . . . *confinis*
Labrum not projected (fig. 179E); metanotum distinctly shorter than mesonotum (fig. 179A), only about twice as long as wide; ninth tergite rounded apically (fig. 179DD, FF, HH) 51
51. Posterior projections of eighth tergite elongate, narrow (fig. 179DD) . . *marcidum*
Posterior projections of eighth tergite shortly triangular (fig. 179HH) . . . . *furtivum*

Schidium pennatum, a doubtful species, could not be included in the key.

Schidium adelphidion, new species

Figure 176FF–II

DESCRIPTION: Macropterous male: Size, 11.5 mm.

Morphology, and coloring of head, thorax, legs, and wings all like those of *eboris*. Coloring and shape of genital region as shown in figure 176FF-HH; posterior carina of pygophore wide; shape of process as illustrated. Chaetotaxy of paramere like that of *malkini*, widened portion more irregular in shape, sensory spines more slender (fig. 176II). Phallus like that of *malkini*.

MATERIAL EXAMINED: Cameroon: Mabete, June 1, 1949 (Malkin; the California Academy of Sciences), one male holotype.

OBSERVATIONS: This species and *eboris*, described below, are unique in *Schidium* in the shape of the parameres of those males that are known.

Schidium alatum (Villiers), new combination

Colasiella alata VILLIERS, 1961, p. 63, figs. 59–62.

DISTRIBUTION: Congo (Léopoldville).

TYPE Male, Musée Royal de l'Afrique Centrale.

Schidium assiniense Villiers

Schidium assiniensis VILLIERS, 1948, p. 468, figs. 930, 934.

DISTRIBUTION: Guinea; Ivory Coast.

TYPE: Female, Muséum National d'Histoire Naturelle.

Schidium bamoun Villiers

Schidium bamoun VILLIERS, 1949c, p. 100.

Villiers (1961) illustrated the genital region of the female and later (Villiers, 1963) that of the male.

DISTRIBUTION: Guinea; Nigeria; Cameroon; Angola?.

TYPE: Male, British Museum (Natural History).

Schidium barrosmachadoi Wygodzinsky

Figure 174P, S

Schidium barrosmachadoi WYGODZINSKY, 1960b, p. 57, figs. 1–14.

DISTRIBUTION: Angola.

TYPE: Male, British Museum (Natural History).

Schidium callipygum, new species

Figure 174A–O

DESCRIPTION: Macropterous female: Length, 25.5 mm.; head, 1.75; thorax, 7.25; abdomen, 16.5 mm.

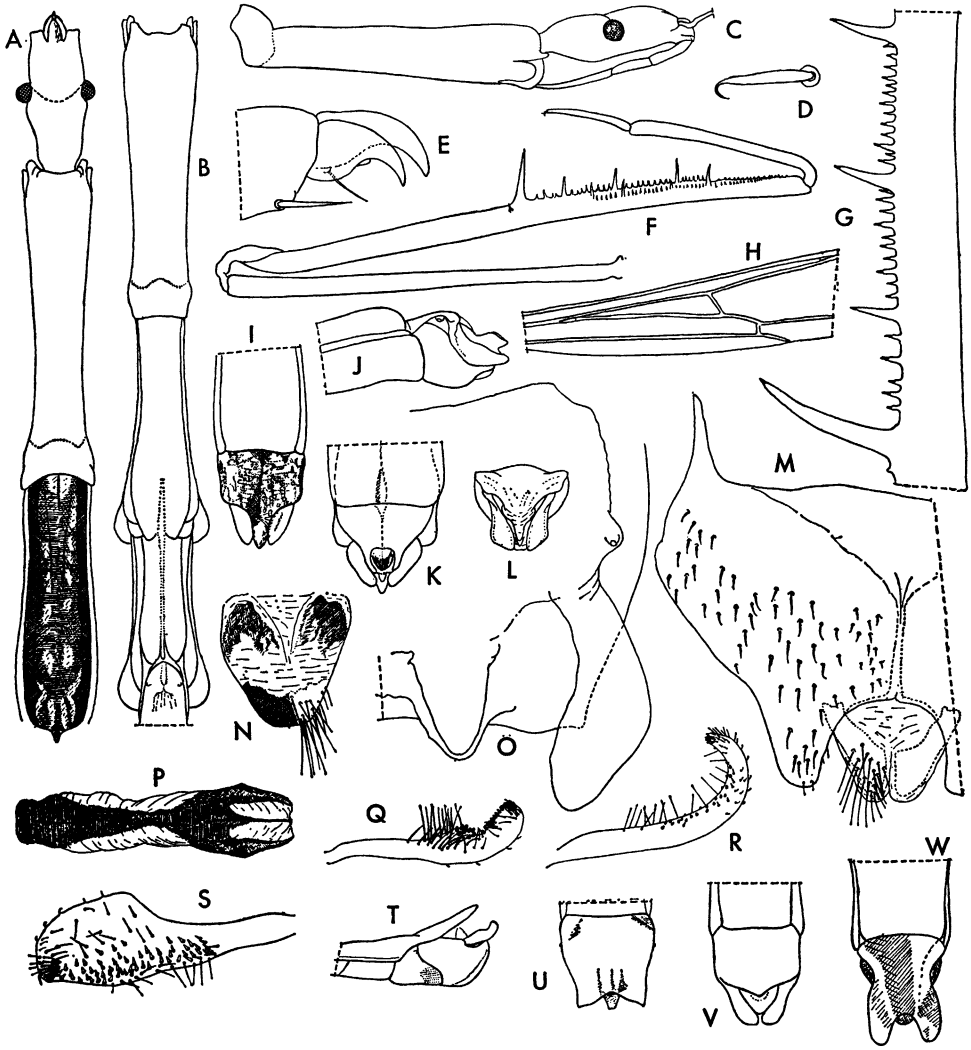


FIG. 174. A–O. *Schidium callipygum*, female. A. Anterior portion of body of macropterous form, seen from above; color pattern shown on mesonotum only. B. Thorax of apterous form, dorsal view. C. Head and prothorax of winged form, lateral aspect. D. Seta of abdomen. E. Apex of fore tarsus, with claws. F. Foreleg. G. Base of posteroventral series of fore femur. H. Portion of forewing. I. Apex of abdomen, dorsal view. J. Apex of abdomen, lateral aspect. K. Genital region, ventral view. L. Genital region, seen from behind. M. Gonocoxite with gonapophyses. N. Syngonapophysis. O. Portion of last tergites, as seen on slide mounts. P. *Schidium barrosmachadoi*, phallosoma, ventral view. Q. *Schidium calundo*, paramere. R. *Schidium montanum*, paramere. S. *Schidium barrosmachadoi*, paramere. T. *Schidium calundo*, male, genital region, lateral view. U. *Schidium rivale*, female, genital region, dorsal view. V. *Schidium spatuliferum*, female, genital region, dorsal view. W. *Schidium hoberlandti*, female, genital region, seen from above. (V adapted from Villiers, 1948.)

Head piceous above and at sides, ochraceous ventrally; clypeus and labrum, antenniferous tubercles, one spot before and one behind interocular sulcus centrally, as well as base of neck dorsally, all testaceous. Rostrum ochraceous, central portion of all segments brown. Antennae ferruginous, first segment darker distally, extreme apex narrowly white. Prothorax piceous laterally and ventrally, dorsal surface castaneous, a median longitudinal line and posterior lobe ochraceous; anterior acetabula whitish. Mesonotum piceous laterally, center of disc castaneous, with flavescent blotches (fig. 174A); lateral carina whitish. Mesopleura and metapleura and sterna piceous, tinged with castaneous, lower portion of mesopleura with a few flavescent spots. Forewings grayish brown, veins light-colored, only those closing apex of discal cell dark, discal cell with a few not very distinct, small, dark spots. Forelegs flavescent, fuscous markings much as in *spatuliferum* (see Villiers, 1949a, p. 380, fig. 301). Coxae and trochantera of mid and hind legs stramineous, variegated with fuscous; femora fuscous, with five or six regularly distributed, stramineous annuli, some of which are wider than long; apex of article dark. Tibia fuscous, with three stramineous annuli on basal half, their size increasing gradually from basal to distal one. Dorsal surface of abdomen ochraceous, posterior segments variegated with brown (fig. 174I); lateral margin of tergites and connexivum fuscous, latter with light-colored patches; dorsum with 1+1 longitudinal red lines. Ventral surface of abdomen castaneous to piceous, darkening posteriorly, intensely spotted with ochraceous. Head and thorax smooth, abdomen delicately striate longitudinally. Head and thorax with very numerous small, whitish, scalelike setae. Modified setae delicately pointed (fig. 174D).

Head and rostrum as shown in figure 174A, C, elongate fusiform in lateral view. Labrum not projecting. Postocular region of head distinctly but not strongly converging posteriorly, faintly constricted at middle. Length of first article of antennae, 13.5 mm.

Thorax as shown in figure 174A, C. Hind lobe of pronotum strongly elevated. Mesonotum very narrow and elongate, smooth, not very convex.

Forelegs as shown in figure 174E–G. Coxa as long as prothorax and postocular region of head combined. Femur slender, more than 20 times as long as its maximum width. Spined portion occupying half of length of article. Posteroventral series composed of one very long basal process, three medium-sized and 50 small processes, the medium-sized processes slightly increasing in size from basal to apical one. Anteroventral series composed of two or three medium-sized and 40 small processes, medium-sized ones increasing in size toward apical one. Tibia one-third as long as femur, with 40 to 45 peglike denticles. Tarsus slightly less than half as long as tibia, its claws subequal in size (fig. 174E). Hind femora surpassing apex of abdomen by 1 mm.; tarsi of mid and hind legs with first and third segments subequal in size, second slightly shorter.

Forewings not surpassing middle of abdomen, venation of their basal portion as shown in figure 174H. Hind wings as long as forewings, their venation like that of *malkini* (see fig. 178H).

Abdomen slender, 14 times as long as width at middle, sides more or less parallel, somewhat widened just before middle and again at apex. Genital region as shown in figure 174I–L. Seventh tergite slightly emarginated behind; seventh sternite impressed at middle before hind margin. Disc of eighth tergite wider than long, sides slightly converging posteriorly, center prolonged behind into large pointed process, posterolateral angles prolonged into elongate, spatulate, backwardly and downwardly directed, somewhat twisted projections. Central portion of ninth tergite in form of short conical projection. Gonocoxites, gonapophyses, and syngonapophysis as shown in figure 174M, N.

Apterous female: Length, 25 mm.; head, 2.0; pronotum, 3.0; mesonotum, 2.5; metanotum, 1.2; abdomen, 16.3 mm. Length of first segment of antennae, 12; of second, 11 mm.

Color much like that of winged form, but flavescent portions of head and thorax somewhat more extensive, and all abdominal tergites variegated with fuscous.

General structural characters like those of winged form. Thorax as shown in figure 174B; mesonotum strongly convex on posterior third, a delicate but distinct, median,

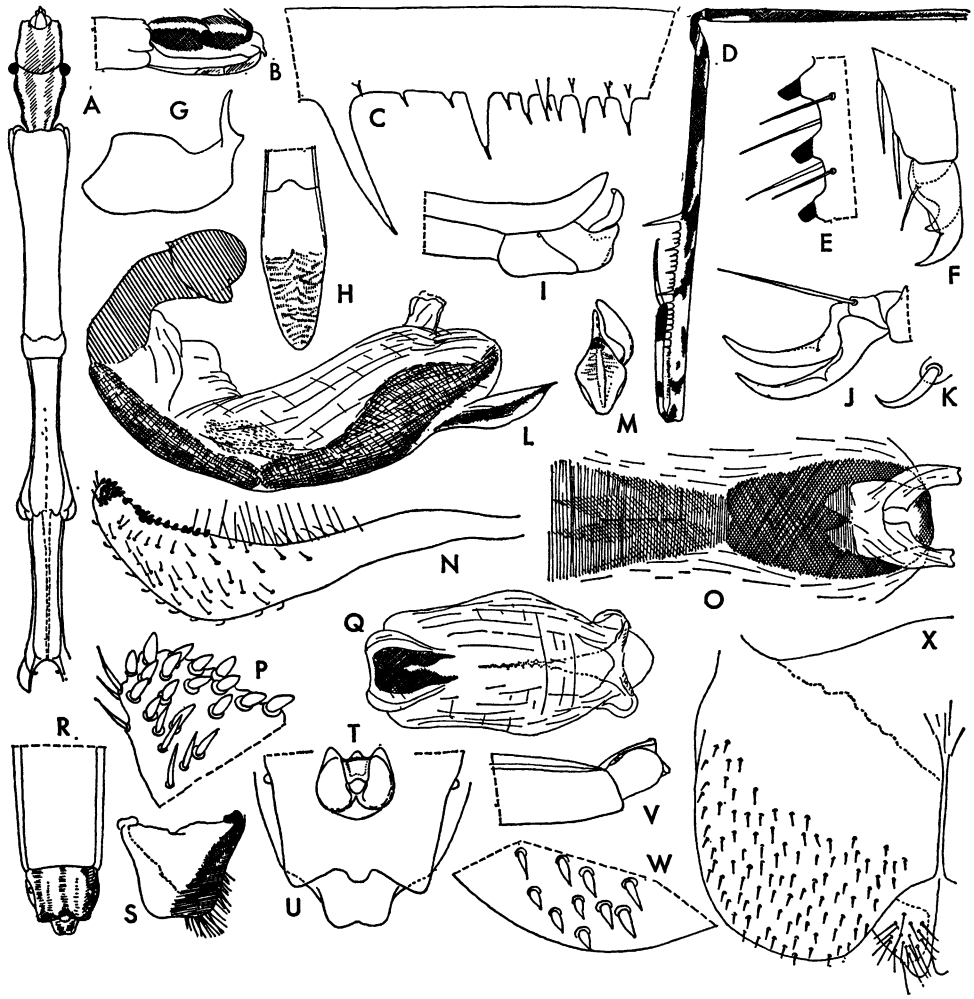


FIG. 175. *Schidium confinis*. A. Head and thorax, dorsal view; color pattern shown on head only. B. Head, lateral view, with color pattern. C. Series of fore femur. D. Foreleg, with color pattern. E. Detail of under surface of fore tibia. F. Apex of fore tarsus, with claws. G. Pygophore, lateral view. H. Apex of abdomen, dorsal aspect. I. Apex of abdomen, lateral view. J. Praetarsus and claws of hind legs. K. Seta of hind femur. L. Phallus, lateral view. M. Pygophore, seen from behind. N. Paramere. O. Phallosoma, ventral aspect. P. Apex of paramere. Q. Endosoma, seen from below. R. Apex of abdomen of female, dorsal view. S. Syngonapophysis. T. Genital region of female, seen from behind. U. Eighth and ninth tergites of female, as seen on slide mount. V. Apex of abdomen of female, lateral aspect. W. Group of small spines of dorsal surface of gonocoxite. X. Gonocoxite with gonapophysis.

longitudinal carina on metanotum and posterior third of mesonotum. Wing pads absent.

MATERIAL EXAMINED: *Sierra Leone*: Njala, June 8, 1926 [E. Hargreaves; British Museum (Natural History)], one macropterous female, holotype. *Ghana*: August 1, 1950 (L. Berner; University of Michigan), one apterous female, paratype. *Ivory Coast*: Bouaké, April 1964 (R. H. Cobben; the American Museum of Natural History), one apterous female, paratype.

OBSERVATIONS: *Schidium callipygum* is clearly related to the Congolese *spatuliferum*, from which it can be distinguished by the characters given in the key; *hoberlandti*, from Madagascar, also seems to belong to the same group. These species are known only from females, all with highly specialized genitalia. The respective males have either not been recognized as belonging to the above species or have not yet been described.

Schidium calundo Wygodzinsky

Figure 174Q, T

Schidium calundo WYGODZINSKY, 1960b, p. 58, figs. 15–30.

DISTRIBUTION: Angola.

TYPE: Male, British Museum (Natural History).

Schidium carayoni Villiers

Schidium carayoni VILLIERS, 1949c, p. 99.

Villiers (1956a) illustrated this species.

DISTRIBUTION: Cameroon.

TYPE: Male, Muséum National d'Histoire Naturelle.

Schidium confinis, new species

Figure 175A–X

DESCRIPTION: Apterous male and female: Length of male, 17.7; of female, 20.2 mm.; male: head, 1.3; pronotum, 2.5; mesonotum, 2.0; metanotum, 1.7; abdomen, 10.2 mm.

General color castaneous, very dark at sides of head and thorax and on abdomen dorsally, whole body irregularly mottled with flavescent. Head with ventral surface, clypeus and labrum, and three wide longitudinal bands dorsally, all stramineous. Rostrum flavescent, with brownish tinge. Antennae testaceous, first article fuscous basally and distally, extreme apex narrowly white. Abdomen of general body color, its dorsal surface with three not very distinct, red, longitudinal lines; connexival segments with alternate whitish and dark regions. Genital region very dark. Gonocoxites of female and pygophore of male piceous, latter flavescent along superior border and along posterior carina. Surface of body dull to subshining; head and thorax with minute, inconspicuous, setiferous granulation, abdomen delicately striate longitudinally. Modified setae narrowly pointed (fig. 175K).

Head and rostrum as shown in figure 175A, B. Postocular region distinctly converging posteriorly, constricted about middle. Labrum in shape of small, cylindrical projection. First segment of rostrum distinctly surpassing middle of anteocular portion, second three-fifths as long as first. Antennae bare in both sexes. Length of first segment of male, 8; of second, 7 mm.

Thorax with proportions as given above, its shape as shown in figure 175A; metanotum with distinct, median, longitudinal carina, latter very faint on mesonotum.

Forelegs as shown in figure 175D. Coxa as long as prothorax and postocular region of head combined. Femur about 20 times as long as its maximum width, parallel-sided; spined portion occupying half of its total length. Posteroventral series composed of one large basal process, three medium-sized, and about 30 small to very small, processes; their apical spines relatively slender (fig. 175C). Tibia about one-third of length of femur, ventrally with about 25 peglike denticles (fig. 175E). Hind femora surpassing apex of abdomen by 1 mm.; tarsi as given in generic description; claws as shown in figure 175J.

Abdomen parallel-sided, slightly narrower at base, somewhat widened apically, that of male about 16 times as long as wide at middle. Genitalia somewhat elevated in relation to longitudinal axis of abdomen.

Male: Last tergite elongate subtriangular (fig. 175H), coarsely rugose transversely, reaching level of posterior border of pygophore. Under surface of eighth sternite not at level with that of seventh (fig. 175I). Pygophore somewhat compressed laterally, its posterior surface rugose transversely, at middle with a conspicuous longitudinal ridge (fig. 175M); spiniform projection of upper

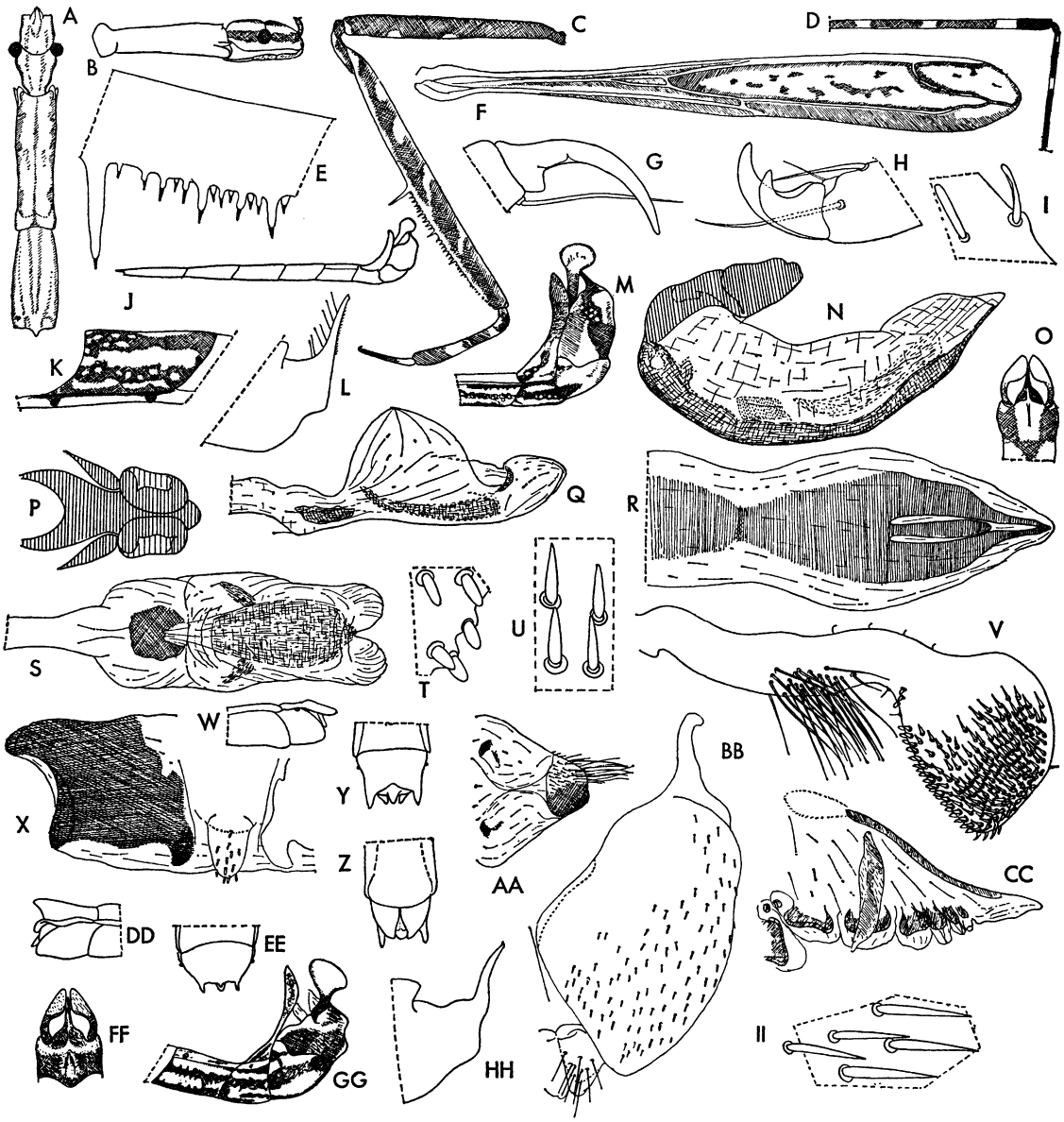


FIG. 176. A–V. *Schidium eboris*, male. A. Head and thorax, dorsal aspect, with color pattern. B. Head and prothorax, side view; head with color pattern. C. Foreleg, with color pattern. D. Apex of hind femur and base of tibia, with color pattern. E. Base of posteroventral series of fore femur. F. Forewing, with color pattern. G. Claw of hind leg. H. Apex of fore tarsus, with claws. I. Setae of hind femur. J. Abdomen, lateral aspect. K. Color pattern of abdominal sternite. L. Posterior portion of pygophore, side view. M. Genital region, lateral aspect, with color pattern. N. Phallus, side view. O. Pygophore, seen from behind. P. Articulatory apparatus. Q. Endosoma, lateral view. R. Apical portion of phallosoma, ventral view. S. Endosoma, seen from below. T. Spines of margin of paramere. U. Spines of disc of paramere. V. Paramere. W–Z, AA–CC. *Schidium* sp., unidentified female, from Adiopodoumé. W. Genital region, lateral view. X. Eighth tergite, as seen on slide mount. Y. Genital region, seen from above. Z. Apex of abdomen, ventral aspect. AA. Syngonapophysis. BB. Gonocoxite with gonapophysis. CC. Posterior gonapophysis. DD, EE. *Schidium reflexum*, female. DD. Apex of abdomen, lateral view. EE. Genital region, seen from above. FF–II. *Schidium adelphidion*, male. FF. Pygophore, seen from behind. GG. Apex of abdomen, lateral view. HH. Apical half of pygophore, side view. II. Spines of disc of paramere.

border as shown in figure 175J, M. Parameres only slightly curved, triangularly widened on apical third, narrowed again distally; long hairs on center of ventral surface; conical spinulets moderate in number, their distribution as shown in figure 175N, P. Lateral aspect of phallus as shown in figure 175L; apical projections of phallobase relatively short, directed backward, pointed. Shield formed by basal plate struts as shown in figure 175 O. Endosoma membranous throughout, lacking sclerotized parts with exception of basal central sclerite (fig. 175Q).

Female: Genitalia as shown in figure 175R, T, V. Eighth tergite subquadrate, its sides almost straight, slightly converging posteriorly; tergite flat above, its posterolateral angles slightly salient, not sharply pointed, its center behind with a small, rounded projection. Ninth sternite simple, somewhat emarginate behind. Gonocoxites and gonapophyses as shown in figure 175X, former posteriorly on dorsal surface with group of small spines (fig. 175W). Syngonapophysis as shown in figure 175S.

MATERIAL EXAMINED: Formosa: Kusempo, October, 1909, June, 1910 (Sauter; the American Museum of Natural History), one male holotype, one female allotype; Takao, 1907 (Sauter; Hungarian National Museum), one female.

OBSERVATIONS: The species is well individualized by the projection of the labrum, its very elongate metanotum, and the structure of the genitalia in both sexes.

Schidium congoense (Schouteden)

Ghilianella congoensis SCHOUTEDEN, 1905, p. 385.

Ischnonyctes congoense: SCHOUTEDEN, 1913, p. 232.

Schidium congoense: VILLIERS, 1949a, p. 378.

The female genital region was illustrated by Villiers (1961).

DISTRIBUTION: Congo (Léopoldville).

TYPE: Female, Musée Royal de l'Afrique Centrale.

Schidium cottesi Villiers

Schidium cottesi VILLIERS, 1948, p. 467, figs. 923, 924.

DISTRIBUTION: Cameroon; Gabon; Congo (Brazzaville); Congo (Léopoldville).

TYPE: Male, Muséum National d'Histoire Naturelle.

Schidium eboris, new species

Figure 176A–V

DESCRIPTION: Macropterous male: Length, 11.5 mm.; head, 1; thorax, 4; abdomen, 6.5 mm.

Head testaceous above, with faint brownish pattern as shown in figure 176A; laterally (fig. 176B) with percurrent, piceous fascia; ventral surface and rostrum ochraceous, latter with faint brownish tinge. Antennae fuscous, first segment ochraceous on basal three-fourths. Prothorax stramineous dorsally and ventrally, dorsal surface with faint brownish pattern as shown in figure 176A; lateral surface piceous, mottled with flavous. Mesonotum stramineous, with dark pattern as shown in figure 176A; mesopleura and metapleura piceous, with a longitudinal line and round spots above and below line, all flavous. Forewings grayish brown, with extensive areas darkened (fig. 176F); veins light-colored, with exception of those at apex of discal cell, latter with small, irregular, dark dots. Forelegs ochraceous, markings brown (fig. 176C). Mid and hind legs testaceous; femora with several faint, narrow, whitish annuli, apex with short, conspicuous, piceous annulus (fig. 176D); base of tibiae piceous, with three to four narrow white annuli on proximal half of article. Abdomen stramineous, connexivum alternately spotted with dark and light. Markings of sternites and of genital region as shown in figure 176K, M. Tergites with one similar mottled dark band along center longitudinally; dorsum with three red lines. Head and thorax smooth; abdomen microscopically striate longitudinally. Modified setae stout, rounded apically.

Head and rostrum as shown in figure 176A, B, sides of postocular region strongly converging posteriorly, constricted at middle. Labrum not projecting. Length of first article of antennae, 6 mm.; relative length of segments, 1/0.85/0.05/0.35.

Thorax as shown in figure 176A, B; hind lobe of pronotum rather strongly elevated. Disc of mesonotum convex, smooth.

Forewings attaining two-thirds of length of abdomen, their venation as shown in figure

176F; hind wing like that of *malkini* (see fig. 178H).

Forelegs as shown in figure 176C, E. Coxa as long as prothorax and postocular region of head combined. Femur rather stout, only 12 times as long as its maximum width. Spined portion half as long as article; posteroventral series composed of one large basal process and three medium-sized and about 35 small processes; anteroventral series composed of two medium-sized and about 32 very small processes; medium-sized processes of both series forming a row distinctly laterad of small processes. Tibia one-third as long as femur, tarsus half as long as tibia, claws unequal in size (fig. 176H). Hind femora surpassing apex of abdomen by 1 mm.; tarsus of mid and hind legs like that of *malkini*, claws more slender (fig. 176G).

Abdomen slender, short. Genital region relatively voluminous, directed upward (fig. 176J, M). Pygophore of irregular outline, longer than high; posterior carina very narrow; posterior process straight in lateral view (fig. 176L). Parameres (fig. 176M, V) rod-shaped and somewhat curved on basal two-thirds, abruptly widened on apical third, widened portion subcircular; inner surface of narrow portion at center with brushlike group of slender setae; inner surface of widened apical portion with extensive field of sensory spines and pegs (figs. 176U, V). Phallus as shown in figure 176N; shield formed by fused struts trifid apically, lateral branches joining apically, enclosing median branch. Ventral processes of phallobase not developed. Endosoma as shown in figure 176Q, S.

MATERIAL EXAMINED: Ivory Coast: Adiopodoumé, 1956, at light (Hallé; Muséum National d'Histoire Naturelle), one male holotype.

OBSERVATIONS: Two winged females with the same collecting data as the male have been examined. Both agree with it in being small (13 mm.), and in the structure and coloring of the head, thorax, wings, and legs, but the genital regions of the females are strikingly different from each other (fig. 176Y, EE). I have identified one of these females as *reflexum* (fig. 176DD, EE). Possibly one of these specimens represents the female of *eboris* or of still another species, but such a fact cannot be established until definitely correlated material of both sexes is found. I have therefore preferred not to name the other female and simply figure its genitalia (fig. 176W–Z, AA–CC). Both specimens are being deposited in the Museum National d'Histoire Naturelle in Paris.

Schidium furtivum (Miller), new combination

Figure 179HH

Ischnonyctes furtivus MILLER, 1948, p. 412, fig. 1.

This species was described from two specimens from the Breddin collection, both supposedly males. Dr. Sachtleben of the Deutsches Entomologisches Institut, where this material is preserved, informed me that only one specimen existed in the collection and was kind enough to send it for examination. This specimen, bearing a type label and Miller's determination label, proved to be a female, very similar in most of its characters to apterous *Schidium marcidum*. The eighth tergite, however, though comparable in its general structure to that of *marcidum*, differs by its much shorter posterior projections, especially the median one (fig. 179HH).

DISTRIBUTION: Java.

TYPE: Female, Deutsches Entomologisches Institut.

Schidium haugi Villiers

Schidium haugi VILLIERS, 1948, p. 469, figs. 822, 931, 935–937.

DISTRIBUTION: Gabon; Congo (Léopoldville).

TYPE: Male, Muséum National d'Histoire Naturelle.

Schidium hoberlandti Villiers

Figure 174W

Ischnonyctes inermiceps: HOBERLANDT, 1942, p. 147, figs. 26–28 (*nec* Bergroth, 1906).

Schidium hoberlandti VILLIERS, 1949a, p. 385.

MATERIAL EXAMINED: Madagascar: Antanimora, December 11, 1959, 300 meters (E. S. Ross; the California Academy of Sciences), one female.

DISTRIBUTION: Madagascar.

TYPE: Female, National Museum, Prague.

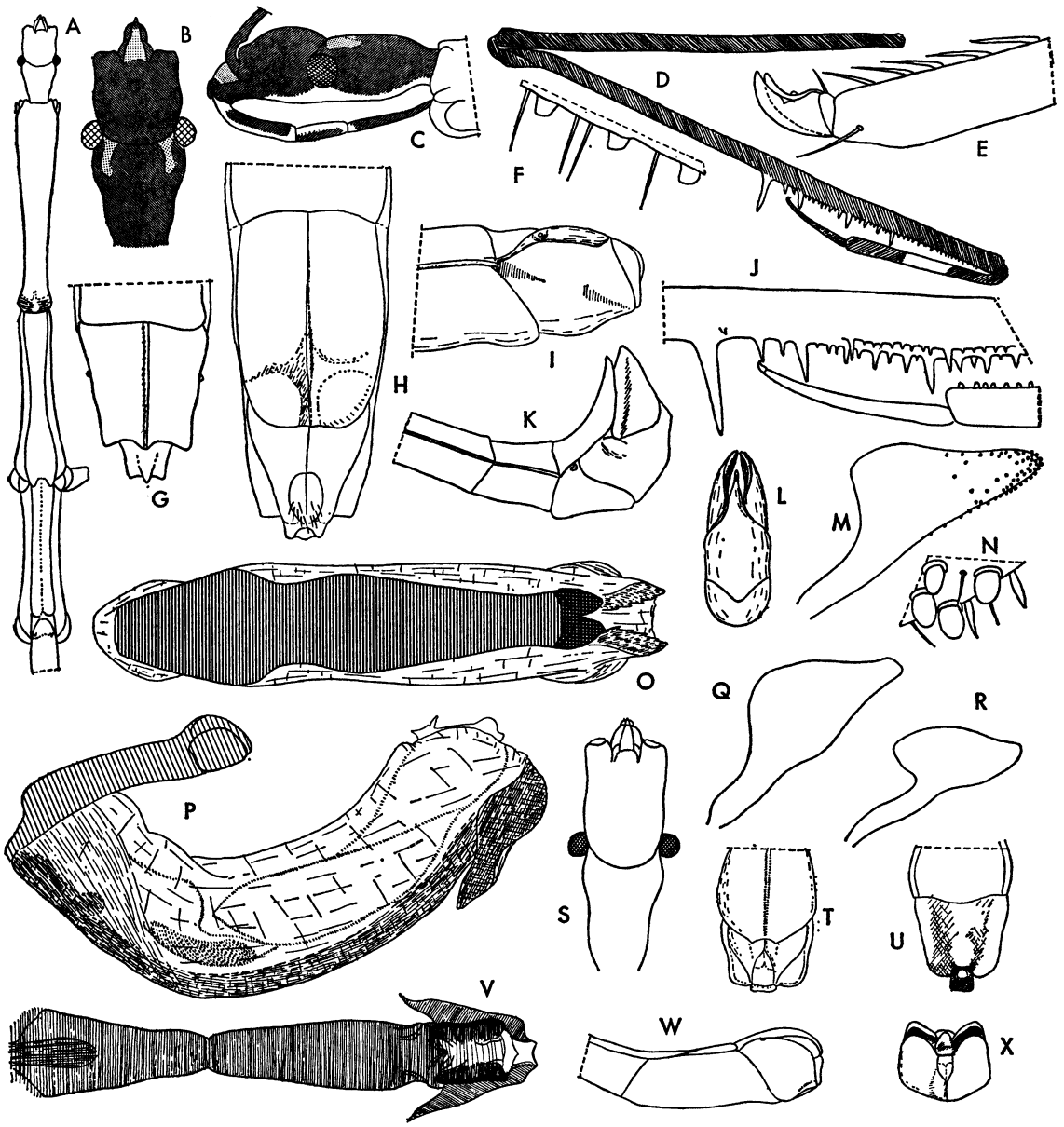


FIG. 177. A–P. *Schidium lemur*. A. Head and thorax, dorsal view. B. Head, from above, with color pattern. C. Head, lateral view, with color pattern. D. Foreleg. E. Apex of fore tarsus, with claws. F. Detail of under surface of fore tibia. G. Genital region of female, dorsal view. H. Apex of abdomen of female, ventral view. I. Genital region of female, lateral aspect. J. Portion of foreleg. K. Apex of abdomen of male, side view. L. Genital region of male, seen from behind. M. Paramere. N. Spines of apex of paramere. O. Phallosoma, ventral view. P. Phallus, lateral aspect. Q. *Schidium matercula*, outline of paramere. R. *Schidium kolleri*, outline of paramere. S–X. *Schidium matercula*. S. Head, seen from above. T. Genital region of female, ventral view. U. Genital region of female, dorsal view. V. Phallosoma, seen from below. W. Apex of abdomen of female, lateral aspect. X. Genital region of female, posterior view.

Schidium ivorense Villiers

Schidium ivorensis VILLIERS, 1960d, p. 1334, figs. 5–7.

DISTRIBUTION: Ivory Coast.

TYPE: Female, Muséum National d'Histoire Naturelle.

Schidium kivuense Villiers

Schidium kivuensis VILLIERS, 1961, p. 58, figs. 48.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Female, Musée Royal de l'Afrique Centrale.

Schidium koba Villiers

Schidium koba VILLIERS, 1956a, p. 175, figs. 1–3.

DISTRIBUTION: Senegal.

TYPE: Unknown.

Schidium kolleri (Villiers), new combination

Figure 177R

Colasiella kolleri VILLIERS, 1949a, p. 388, figs. 315–317.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Male, Musée Royal de l'Afrique Centrale.

Schidium lamottei Villiers

Schidium lamottei VILLIERS, 1948, p. 470.

DISTRIBUTION: Guinea: Congo (Léopoldville).

TYPE: Male, Muséum National d'Histoire Naturelle.

Schidium lemur Bergroth

Figure 177A–P

Schidium lemur BERGROTH, 1916, p. 231.

The figures given by Wygodzinsky (1950c) and reproduced here are supplemented by drawings of the phallosoma. The endosoma, not examined in detail, is basically like that of the related *matercula* (see fig. 177V).

This is the type species of *Schidium*. As mentioned above, it forms a distinct species group with *alatum*, *kolleri*, and *matercula*, restricted to equatorial Africa.

DISTRIBUTION: Liberia.

TYPE: Female, United States National Museum.

Schidium loangoense Villiers

Schidium loangoensis VILLIERS, 1961, p. 59, fig. 45–47.

Schidium cottesi VILLIERS, 1948, p. 467 (part).

DISTRIBUTION: Congo (Brazzaville).

TYPE: Female, Muséum National d'Histoire Naturelle.

Schidium malkini, new species

Figure 178A–Z, AA–DD

DESCRIPTION: Macropterous male: Length, 17.1 mm.; head, 1.3; thorax, 5.7; abdomen, 10.1 mm.

General color castaneous. Head piceous laterally, stramineous below and on clypeus; pattern of dorsal and lateral surfaces as shown in figure 178B. Rostrum stramineous, with faint brownish tinge. Antennae brown; first segment piceous basally and distally, extreme apex narrowly white. Thorax of general color, very dark at sides and below; pronotum with faint median fascia and irregular faint streaks on disc flavescent; lateral carina of mesonotum stramineous. Forewings light grayish brown, veins fuscous, apical cells with a few dark spots. Forelegs testaceous, virtually concolorous, with very faint lighter regions; processes of fore femur whitish, largest darkened on apical half. Mid and hind legs testaceous; coxae spotted with dark; femora with several very faint, narrow, whitish annuli, one wide subapical annulus piceous and one wide apical annulus whitish; tibiae on basal half annulated alternately with whitish and fuscous. Abdomen darker below than above, with faint, irregular, longitudinal, flavescent stripes; connexival segments with alternating dark and light regions. Apical segments piceous; carina and base of posterior process of pygophore fulvous. Surface of body dull; head and thorax smooth, abdomen microscopically striate longitudinally. Modified setae delicately pointed (fig. 178F).

Head and rostrum as shown in figure 178A, B. Postocular region with sides distinctly converging posteriorly in dorsal view, only very faintly constricted at middle. Labrum not projecting. Antennae bare; length of first segment, 9 mm.; relative length of segments, 1/0.9/0.04/0.3.

Thorax as shown in figure 178A, B. Posterior portion of hind lobe of pronotum cari-

nate along middle. Disc of mesonotum convex, smooth.

Forelegs as shown in figure 178C. Coxa as long as prothorax and postocular portion of head combined. Femur slender, parallel-sided, 20 times as long as its maximum width; spined portion occupying half of length of article. Posteroventral series composed of one large basal process and three medium-sized, and about 35 small to very small, processes; anteroventral series composed of two or three medium-sized and about 35 small processes. Tibia one-third as long as femur, with about 30 peglike denticles. Tarsus one-half as long as tibia; claws subequal in size (fig. 178D). Hind tarsi and claws as shown in figure 178E, L.

Forewings attaining center of abdomen, their venation as shown in figure 178G. Hind wings attaining apex of forewings, their veins as shown in figure 178H.

Abdomen virtually parallel-sided, very slightly widened toward middle, about 12 times as long as wide at center, carinate below to sixth sternite. Seventh tergite bent upward, rugose transversely (fig. 178N, R). Genitalia elevated in relation to longitudinal axis of abdomen (fig. 178N). Under surface of eighth sternite not at level with that of seventh. Pygophore slightly compressed laterally, its posterior surface delicately rugose transversely, at middle with a rather wide longitudinal ridge (fig. 178K), somewhat swollen below base of apical spine, swollen portion polished; shape of apical spine as shown in figure 178K, O. Parameres slender, rod-shaped, slightly curved, ventral surface with several long setae, especially numerous at apex, inner surface apically with sensory pegs as shown in figure 178J. Phallus as shown in figure 178I, M, P; apical projections of phallobase short, crest-shaped; shield formed by basal plate struts elongate-trifid (fig. 178M). Endosoma as shown in figure 178Q, possessing various pairs of sclerites in addition to unpaired basal one.

Apterous female: Length, 18.3 mm.; head, 15; pronotum, 2.3; mesonotum, 2; metanotum, 1; abdomen, 11.5 mm.

General color castaneous. Coloring of head, antennae, and rostrum like that of male. Pronotum either like that of male, or with more distinct pattern elements (fig. 178S); mesonotum and metanotum concolorous; lateral surface not very dark, ventral surface mottled with lighter. Abdomen dark castaneous to piceous, faintly and sparsely spotted with flavescent; posterior sternites and last tergites uniformly dark. Connexivum like that of male. Dorsal surface of abdomen with three red lines as in male. Coloring of legs like that of male, but forelegs with distinct flavescent pattern (fig. 178W), mid and hind legs with narrow whitish annuli more conspicuous. Surface of body like that of male.

Shape of head (fig. 178S) and rostrum like that of male.

Proportion of nota as given above, their shape as shown in figure 178S. Wing pads absent; mesonotum rather strongly convex on posterior third, metanotum with a median longitudinal ridge.

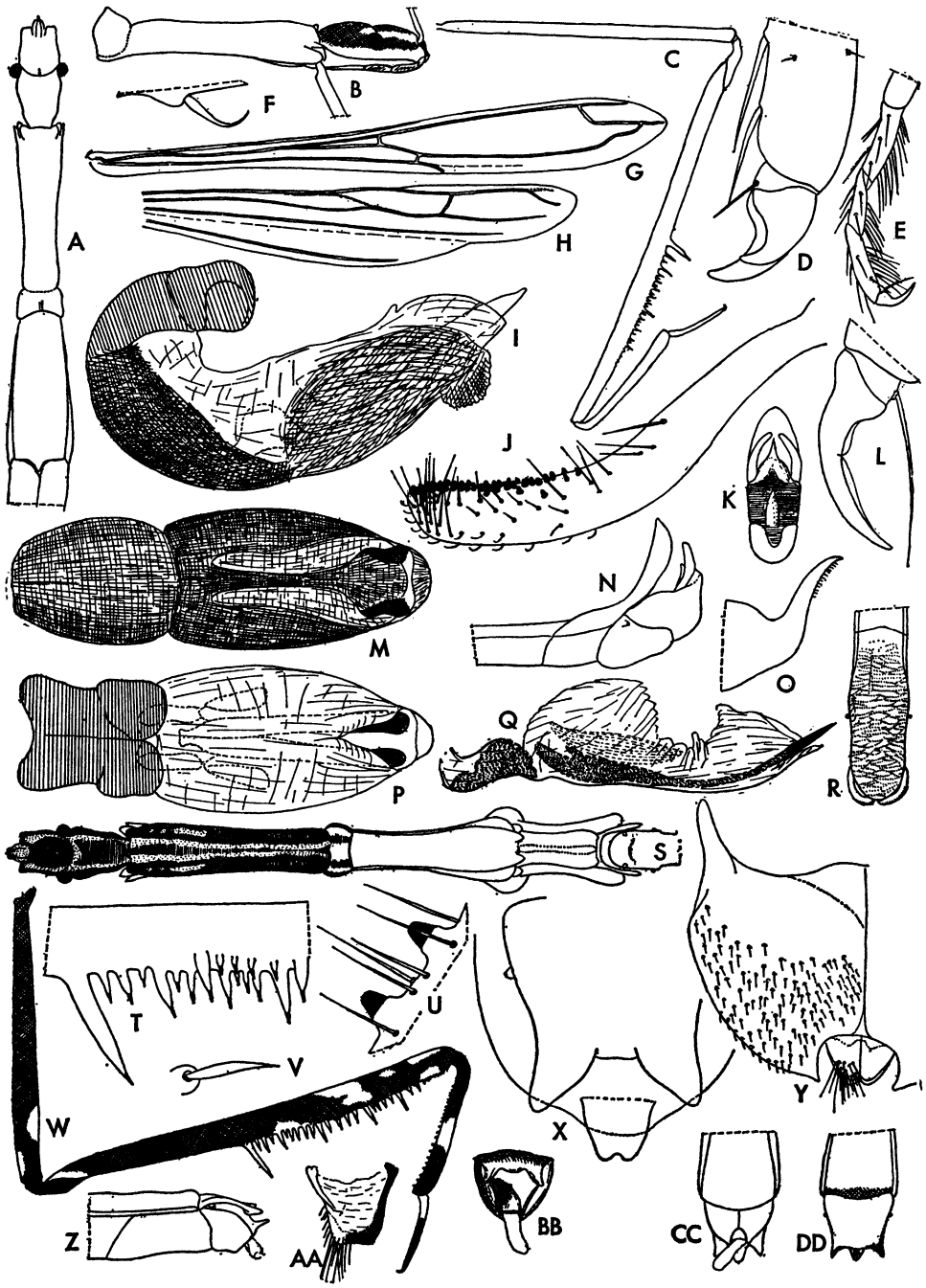
Legs like those of male, but fore femur stouter, only about 13 times as long as maximum width (fig. 178T, U, W).

Abdomen almost parallel-sided, somewhat narrowed on basal fourth; its length equal to 13 times its width at middle. Genital region not elevated in relation to rest of abdomen (fig. 178Z). Eighth tergite (fig. 178DD) about as long as wide, its sides converging posteriorly, posterolateral angles shortly and acutely produced, posterior border slightly salient in middle. Ninth tergite in shape of a short, subconical salience when seen from above (fig. 178DD), well developed when observed from behind (fig. 178BB). Gonocoxites, gonapophyses, and syngonapophysis as shown in figure 178Y, AA.

MATERIAL EXAMINED: Cameroon: Mabete, Victoria, June 1, 1949 (Malkin; the California Academy of Sciences), one male holotype, one female allotype, one female paratype; Metet, September 22, 1919 (A. I. Good; Carnegie Museum), one male paratype.

OBSERVATIONS: The males and females described above are considered to be conspecific, not only because they are correlated geographically but also because of their similar size and coloring.

The male seems to be near the Congolese *rubrolineatum*, as shown in the key. The apterous male of *nutricola* is also similar, but in the latter species the process of the pygophore is relatively much shorter, and the mesothorax and metathorax possess filiform


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD

wing pads. The female of *malkini* may be compared to that of *schoutedeni* and that of *nutricola* but differs from both by numerous characters pertaining to coloring, structure of the thoracic nota, and the genitalia.

Schidium marcidum (Uhler)

Figure 179A–Z, AA–GG

Emesa marcida UHLER, 1896, p. 273.
Ischnonyctes marcidus: BERGROTH, 1906a, p. 321.
Schidium marcidum: WYGODZINSKY, 1956, p. 202, figs. 60–84.
Gardena marcida: MIYAMOTO, 1961, p. 218.
Ischnonyctes praedicator KIRKALDY, 1899, p. 78.
Ischnonyctes alatus DISTANT, 1903e, p. 217, fig. 153.

The redescription and figures given by Wygodzinsky (1956) are here supplemented with drawings of the praetarsus of the hind legs and details of the male and female genitalia. The shield formed by the fused struts of the phallosoma is trifid, as in most African species. *Schidium marcidum* is characterized in the male sex by the 1+1 small sclerites at the distal opening of the phallobase, the very slender apical processes of the same, and the structure of the endosoma (fig. 179S, T). The genitalia of the apterous male (fig. 179K, N, V) are larger than those of the macropterous specimens (fig. 179J, P, U).

MATERIAL EXAMINED: *Japan:* Kyushu: Fukuoka, November 29, 1956 (S. Miyamoto; the American Museum of Natural History), two apterous males, three apterous females; Kyushu: Kurume, November 7, 1955 (S. Miyamoto; the American Museum of Natural History), one apterous male, one apterous female. *New Ireland:* Gilingil Pl'n [?Plantation], July 4, 1956, light trap, 2 meters (J. L. Gressitt; Bernice P. Bishop Museum), one female. *New Guinea:* West New Guinea: Sabron, Cyclops Mountains, camp II, July 1936, 2000 feet [L. E. Cheesman; British Museum (Natural History)], one macropterous male. *Western Australia:* Fortescue River, Hammersley Range (W. D. Dodd; South Australian Museum), one macropterous female.

DISTRIBUTION: (Apterous form): China; Japan; (macropterous form): Ceylon; Java; New Ireland; New Guinea; Australia.

TYPES: Of *marcidum*, male, United States National Museum; of *praedicator*, unknown; of *alatus*, British Museum (Natural History).

Schidium marmoratum (Jeannel)

Ischnonyctes marmoratum JEANNEL, 1919, p. 158, fig. 10, pl. 5, fig. 9.
Schidium marmoratum: VILLIERS, 1949a, p. 374, figs. 282, 285, 287.

The original description was based on a female. The male described by Villiers (1960a) as *marmoratum* belongs to a different species (*meruensis*).

DISTRIBUTION: Kenya.

TYPE: Female, Muséum National d'Histoire Naturelle.

Schidium matercula (Bergroth)

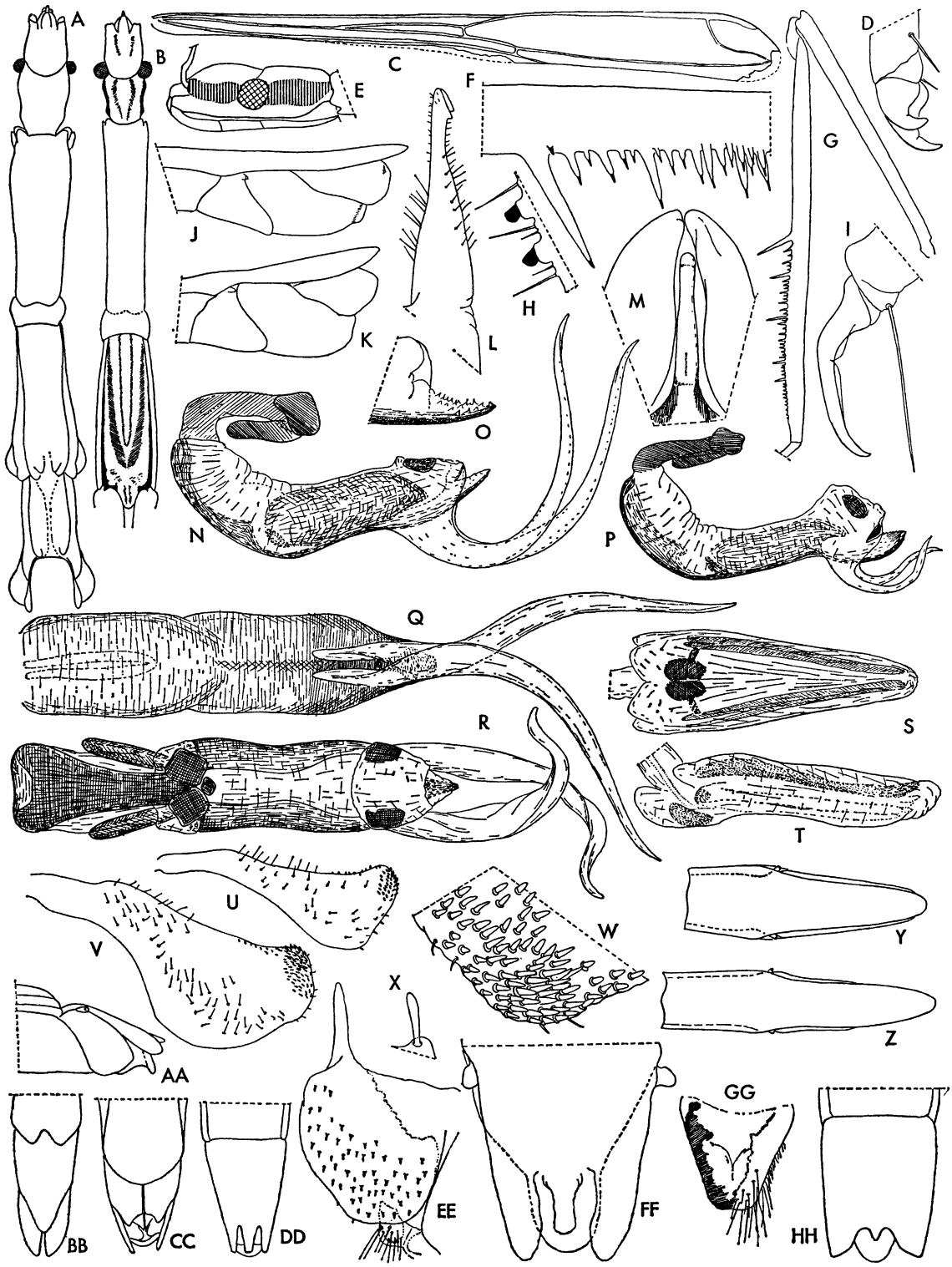
Figure 177Q, S–X

Ghilianella matercula BERGROTH, 1903a, p. 8.
Schidium matercula: BERGROTH, 1916, p. 230.
Colasiella matercula: VILLIERS, 1948, p. 472, figs. 938–946.

The genitalia of the male (fig. 177Q, V; and illustrations in Villiers, 1948, 1949a) are very much like those of *lemur*, but the genitalia of

---

FIG. 178 (OPPOSITE PAGE). *Schidium malkini.* A. Anterior portion of body of male, dorsal view. B. Head and prothorax of male, lateral view; pigment pattern shown on head. C. Foreleg of male. D. Apex of fore tarsus, with claws. E. Posterior tarsus. F. Seta of posterior femur. G. Forewing. H. Hind wing. I. Phallus, lateral view. J. Paramere. K. Genital region, seen from behind. L. Claw of hind leg. M. Phallus, ventral aspect. N. Apex of abdomen of male, lateral view. O. Posterior half of pygophore, side view. P. Phallus, seen from above. Q. Endosoma, lateral view. R. Last tergite of male, dorsal aspect. S. Anterior portion of body of female, dorsal view; head and prothorax with color pattern. T. Base of series of fore femur of female. U. Detail of under surface of fore tibia. V. Seta of posterior femur. W. Foreleg of female, with color pattern. X. Eighth and ninth tergites of female, as seen on slide mount. Y. Gonocoxite with gonapophysis. Z. Apex of abdomen of female, side view. AA. Syngonapophysis. BB. Genital region of female, seen from behind. CC. Apex of abdomen of female, ventral view. DD. Genital region of female, dorsal view.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
EE
FF
GG
HH

the female (fig. 177T, U, W, X; and in Villiers, 1948, 1949a) differ from those of *lemur*, among other details, by the fact that the small, upwardly projected process of the ninth tergite is situated within the apical emargination of the eighth.

MATERIAL EXAMINED: Ghana: near North Kawkaw, June 1, 1943 [H. E. Box; British Museum (Natural History)], one female; Asuansi, 1940 [H. E. Box; British Museum (Natural History)], one male.

DISTRIBUTION: Ivory Coast; Ghana.

TYPE: Male, Museum Zoologicum Universitatis.

Schidium meruensis Villiers

Schidium marmoratum: VILLIERS, 1960a, p. 457, fig. 6 (*nec* Jeannel).

Schidium meruensis VILLIERS, 1962b, p. 474, figs. 22, 23.

DISTRIBUTION: Tanganyika.

TYPE: Male, Musée Royal de l'Afrique Centrale.

Schidium montanum Wygodzinsky

Figure 174R

Schidium montanum WYGODZINSKY, 1960b, p. 60, figs. 31–46.

DISTRIBUTION: Angola.

TYPE: Male, British Museum (Natural History).

Schidium mougini Villiers

Schidium mougini VILLIERS, 1951, p. 335, fig. 5.

DISTRIBUTION: Sudan.

TYPE: Male, Institut Français d'Afrique Noire.

Schidium nutricola (Bergroth)

Ghilianella nutricola BERGROTH, 1903a, p. 9.
Schidium nutricola BERGROTH, 1916, p. 230.

The species has been illustrated by Villiers (1948).

DISTRIBUTION: Guinea; Ivory Coast.

TYPE: Museum Zoologicum Universitatis.

Schidium oldeanensis Villiers

Schidium oldeanensis VILLIERS, 1962b, p. 475, figs. 24–26.

DISTRIBUTION: Tanganyika.

TYPE: Musée Royal de l'Afrique Centrale.

Schidium pelissieri Villiers

Schidium pelissieri VILLIERS, 1953b, p. 36, fig. 7.

DISTRIBUTION: Madagascar.

TYPE: Female, Muséum National d'Histoire Naturelle.

Schidium pennatum (Bergroth), new combination

Ischnonyctes pennatus BERGROTH, 1915, p. 113.

Though I formerly (Wygodzinsky, 1956) synonymized this species with *marcidum*, I now prefer to maintain it as a different taxon, especially considering Bergroth's description (1915) of the eighth tergite of the female, viz., "apice utrinque in processum angustum apice obtusum paullo ultra segmentum genitale secundum retrorsum producto." No median process, so conspicuous in *marcidum*, was mentioned. The description of the eighth tergite does not apply to *furtivum*, another Javanese species, in which a small but dis-

---

FIG. 179 (OPPOSITE PAGE). A–Z, AA–GG. *Schidium marcidum*. A. Anterior portion of body of apterous male, dorsal view. B. Anterior portion of body of winged female, dorsal view, with color pattern. C. Forewing. D. Apex of fore tarsus, with claws. E. Head of winged female, lateral view, with color pattern. F. Base of series of fore femur. G. Foreleg. H. Detail of under surface of fore tibia. I. Praetarsus of hind leg, with claw. J. Genital region of winged male, lateral view. K. Genital region of apterous male, lateral aspect. L. Apical process of pygophore, lateral view, high magnification. M. Apex of pygophore and parameres, posterior view, high magnification. N. Phallus of apterous male, lateral aspect. O. Apical projection of phallosoma of apterous male, lateral view. P. Phallus of winged male, lateral aspect. Q. Phallosoma of apterous male, seen from below. R. Phallus of apterous male, dorsal aspect. S. Endosoma of apterous male, ventral view. T. Endosoma of apterous male, side view. U. Paramere of winged male. V. Paramere of apterous male. W. Apical region of paramere of apterous male. X. Seta of fifth sternite. Y. Seventh tergite of apterous male, dorsal view. Z. Seventh tergite of winged male, dorsal view. AA. Genital region of winged female, lateral view. BB. Genital region of winged male, ventral view. CC. Apex of abdomen of winged female, as seen from below. DD. Apex of abdomen of winged female, dorsal aspect. EE. Gonocoxite with gonapophysis. FF. Eighth and ninth tergites of female, as seen on slide mount. GG. Syngonapophysis. HH. *Schidium furtivum*, female, apex of abdomen, dorsal view.

tinct median process exists on the eighth tergite, and in which the lateral projections cannot be called "angustum" (fig. 179HH).

Unfortunately the lack of sufficient data makes it impossible to include *pennatum* in the key.

DISTRIBUTION: Java.

TYPE: Unknown.

Schidium reflexum Villiers

Figure 176DD, EE

Schidium reflexum VILLIERS, 1959, p. 345.

The specimen now examined corresponds well to Villiers' description and figures (1959, 1961), but the lateral projections of the ninth tergite are not distinctly curved downward. As mentioned above, the possibility is not excluded that the species here described as *eboris* represents the male of *reflexum*, known in the female sex only.

MATERIAL EXAMINED: Ivory Coast: Adiopodoumé, 1956, at light (Hallé; Muséum National d'Histoire Naturelle), one female.

DISTRIBUTION: Ivory Coast; Guinea.

TYPE: Female, Muséum National d'Histoire Naturelle.

Schidium rivale Wygodzinsky

Figure 174U

Schidium rivale WYGODZINSKY, 1960b, p. 62, figs. 47–56.

DISTRIBUTION: Angola.

TYPE: Female, British Museum (Natural History).

Schidium rubrolineatum Villiers

Schidium rubrolineatum VILLIERS, 1949a, p. 382.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Male, Musée Royal de l'Afrique Centrale.

Schidium saegeri Villiers

Schidium saegeri VILLIERS, 1964, p. 127, fig. 56.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Female, Institut des Parques Nationaux du Congo et du Rwanda.

Schidium schoutedeni Villiers

Schidium schoutedeni VILLIERS, 1949a, p. 375, figs. 283, 286, 288.

DISTRIBUTION: Congo (Léopoldville); Tanganyika.

TYPE: Female, Musée Royal de l'Afrique Centrale.

Schidium spatuliferum Villiers

Schidium spatuliferum VILLIERS, 1948, p. 467, figs. 922, 929, 932, 933.

Schidium grande VILLIERS, 1949a, p. 377, fig. 292.

DISTRIBUTION: Congo (Léopoldville); Angola.

TYPES: Of *spatuliferum*, female, Musée Royal de l'Afrique Centrale; of *grande*, male, Musée Royal de l'Afrique Centrale.

Schidium strangulatum Villiers

Schidium strangulatum VILLIERS, 1949a, p. 379, figs. 295, 300, 307, 308.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Male, Musée Royal de l'Afrique Centrale.

Schidium tibbu (Villiers), new combination

Metapterus tibbu VILLIERS, 1960c, p. 1328, figs. 12–16.

This species, described by Villiers in *Metapterus*, differs from the type of the latter by such important characters as the shape of the postocular portion of the head, the lack of a labral spine, the fore tibiae, which are shorter than half of the length of the femora, the three conspicuous posterior projections of the eighth tergite, and the much larger ninth tergite which is partly visible from above. All these features agree well with conditions found in *Schidium*, to which this species is herein transferred.

DISTRIBUTION: Tibesti.

TYPE: Unknown.

TAITAIA, NEW GENUS

DESCRIPTION: Micropterous male: Small-sized species (6 mm.).

Body surface sparsely tuberculate; setae sparse and short; modified setae rounded apically. Color stramineous to brownish; striking pattern elements absent.

Head short, anteocular about as long as postocular region, latter rounded behind in dorsal view. Clypeus with short projection beset with spiniferous tubercles. Rostrum

very slightly bent between first and second segments; first segment much longer than second but not attaining level of anterior border of eye; third segment much longer than second, almost as long as first. Eyes very small. Posterior border of interocular furrow much behind level of posterior border of eyes. Dorsal surface of head with several large spines. Antennae inserted somewhat before middle of anteocular portion.

Pronotum subcylindrical, narrowed posteriorly, its hind lobe not clearly distinct. Mesonotum and metanotum combined slightly shorter than pronotum, metanotum shortest. Minute wing pads on mesonotum and metanotum.

Femur of forelegs with three series of spiniferous processes. Posteroventral series beginning at base of article, composed of elongate spiniferous process bearing very short apical spines; spines on middle of segment longest. Anteroventral series similar, but processes shorter; not interrupted at base. Accessory series accompanying posteroventral series composed of minute spiniferous processes. Tibia about two-thirds as long as femur, with two rows of rather large spiniferous processes similar to those of femur, but their apical spines relatively longer. Tarsus not segmented, as long as tibia, with setae on all surfaces, those of ventral surface deflected and more numerous, forming a row; lateral surface furthermore with a few strong spiniform setae. Two subequal claws, inner one with medially incised, ventral lamella. Mid and hind legs relatively short and stout; femora and tibiae with numerous short, setiferous tubercles, their setae short, rounded apically. Tarsi three-segmented, basal segment longest, second and third subequal in length. Claws simple.

Abdomen widened at middle, suboval in outline. Tergites and sternites lacking special structures. Eighth sternite very large, almost as large as pygophore, latter somewhat compressed laterally, posterosuperior border lacking spine or process. Parameres simple. Phallus symmetrical. Basal plates short, fused for most of their length, divergent only at insertion of phallosoma. Phallobase elongate, subcylindrical, sclerotized on most of its ventral surface and on apical half of dorsal and lateral surfaces. Opening of phallosoma directed backward and slightly downward. Endosoma simple, more or less tubular, its wall with annular structure elements.

TYPE SPECIES: *Taitaia zimmermani*, new species.

ETYMOLOGY: From Mt. Taita, where the type was collected.

DISTRIBUTION: Austral Islands.

OBSERVATIONS: The position of this highly aberrant genus is open to some doubt. Though very similar in over-all aspect to some of the Leistarchini, *Taitaia* cannot belong there, as one of its fore claws possesses a medially incised ventral lamella, a character not found in that tribe, and its phallus is quite different from that of the Leistarchini. The structure of the phallus excludes *Taitaia* also from the Ploiariolini, in which a double vesica has been developed. Among the remaining tribes, it seems that *Taitaia* agrees best with the Metapterini because of the presence of modified setae found so often in that tribe, and the general structure of the phallus with its subcylindrical, extensively sclerotized phallosoma. The structure of the head and forelegs of *Taitaia* is unique in the subfamily and indicates considerable evolutionary divergence.

Taitaia zimmermani, new species

Figure 180A–S

DESCRIPTION: Male: Length, 6 mm.; head, 0.9; pronotum, 1.15; mesonotum and metanotum combined, 1.2; and abdomen, 2.75 mm.

Color brown, strongly mottled with stramineous and red, especially on abdomen; pygophore with large, light-colored spot centrally on ventral surface; parameres almost black. Legs stramineous; forelegs largely mottled with brown; mid and hind legs with coxa and trochanter dark, femora with two narrow subbasal annuli, one wider submedian annulus, and one very wide subapical annulus all dark; tibiae with one narrow annulus both basally and apically, as well as three intermediate wider dark annuli. Body surface partly shining, beset with not very numerous small setiferous tubercles on head, thorax, and abdomen, as well as on legs; setae as shown in figure 180G, H.

Head and rostrum as given in generic description and shown in figure 180A, B. Eyes

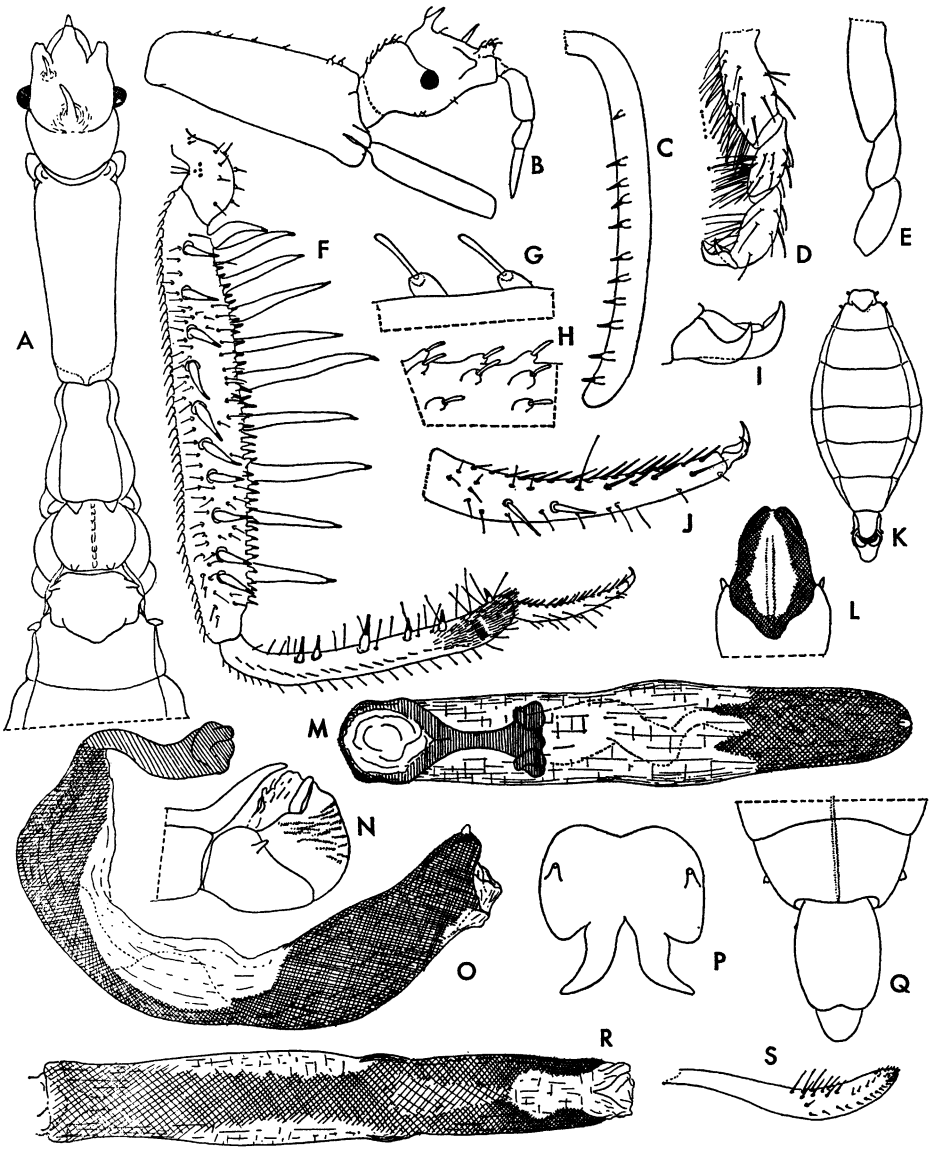


FIG. 180. *Taitaia zimmermani*, male. A. Anterior portion of body, dorsal view. B. Head and thorax, lateral aspect. C. Fore tibia with spines of posteroventral series. D. Tarsus of second pair of legs. E. Outlines of tarsus of hind legs. F. Foreleg, except coxa; tibia showing spines of anteroventral series. G. Setae of dorsal surface of fore femur. H. Setae of posterior femur. I. Claws of foreleg. J. Fore tarsus. K. Abdomen, seen from above. L. Genital region, seen from behind. M. Phallus, dorsal aspect. N. Genital region, side view. O. Phallus, lateral aspect. P. Eighth sternite, as seen on slide mount. Q. Apex of abdomen, ventral aspect. R. Phallosoma, seen from below. S. Paramere.

very small, remote from level of dorsal and ventral surfaces of head. Spine situated before transverse constriction large, directed forward; only left side dorsally behind base of antenniferous tubercle with spine. Antennae bare; length of first segment, 2.0 mm.; relative length of segments, 1/0.65/0.08/?.

Thorax as shown in figure 180A, B. Prothorax subcylindrical, its structure simple; mesonotum slightly elevated above, somewhat constricted at anterior third, its lateral carinae distinctly tuberculate; metanotum almost circular in outline, convex above, with distinct, median, longitudinal carina; all carinae tuberculate. Minute wing pads at posterior borders of mesonotum and metanotum, those of mesonotum conspicuously stramineous. Scutellum not developed.

Shape and structure of forelegs as given in generic description and shown in figure 180C, F, G, I, J. Coxa much shorter than pronotum laterally, as long as head. Posteroventral and anteroventral series each with about 10 spiniferous processes, accessory series with about 40. Tibia in each row with six to eight spiniferous processes of irregular size and distribution. Chaetotaxy of fore tarsus and shape of claws as illustrated. Mid and hind legs as given in generic description and shown in figure 180D, E, H; hind femora surpassing apex of abdomen by 1 mm.

Shape and structure of abdomen as shown in figure 180A, K, its surface rather coarsely and irregularly rugose. Ventral surface keeled along middle from base to seventh sternite. Connexivum slightly wider ventrally than dorsally; spiracles very prominent. Seventh tergite broadly tongue-shaped in dorsal view, rugose transversely, directed upward, partly covering pygophore from above (fig. 180K, N). Seventh sternite large, fully exposed, participating in formation of pygophore, emarginated behind at middle, anteriorly with two large apodemes (fig. 180P). Shape of pygophore as shown in figure 180E, K, L, N, Q, its hind border almost straight, vertical, its upper margin slightly salient between parameres but not spined; a faint longitudinal carina along center of disc; lateral portions delicately rugose transversely. Parameres short, slender, their shape and chaetotaxy as shown in figure 180S. Phallus as given in generic description and shown in figure 180M, O, R.

MATERIAL EXAMINED: Austral Islands: Tubuai, southwest ridge of Mt. Taita, August 21, 1934, 1200 feet (E. C. Zimmerman; Bernice P. Bishop Museum), one male holotype.

TUBUATAITA, NEW GENUS

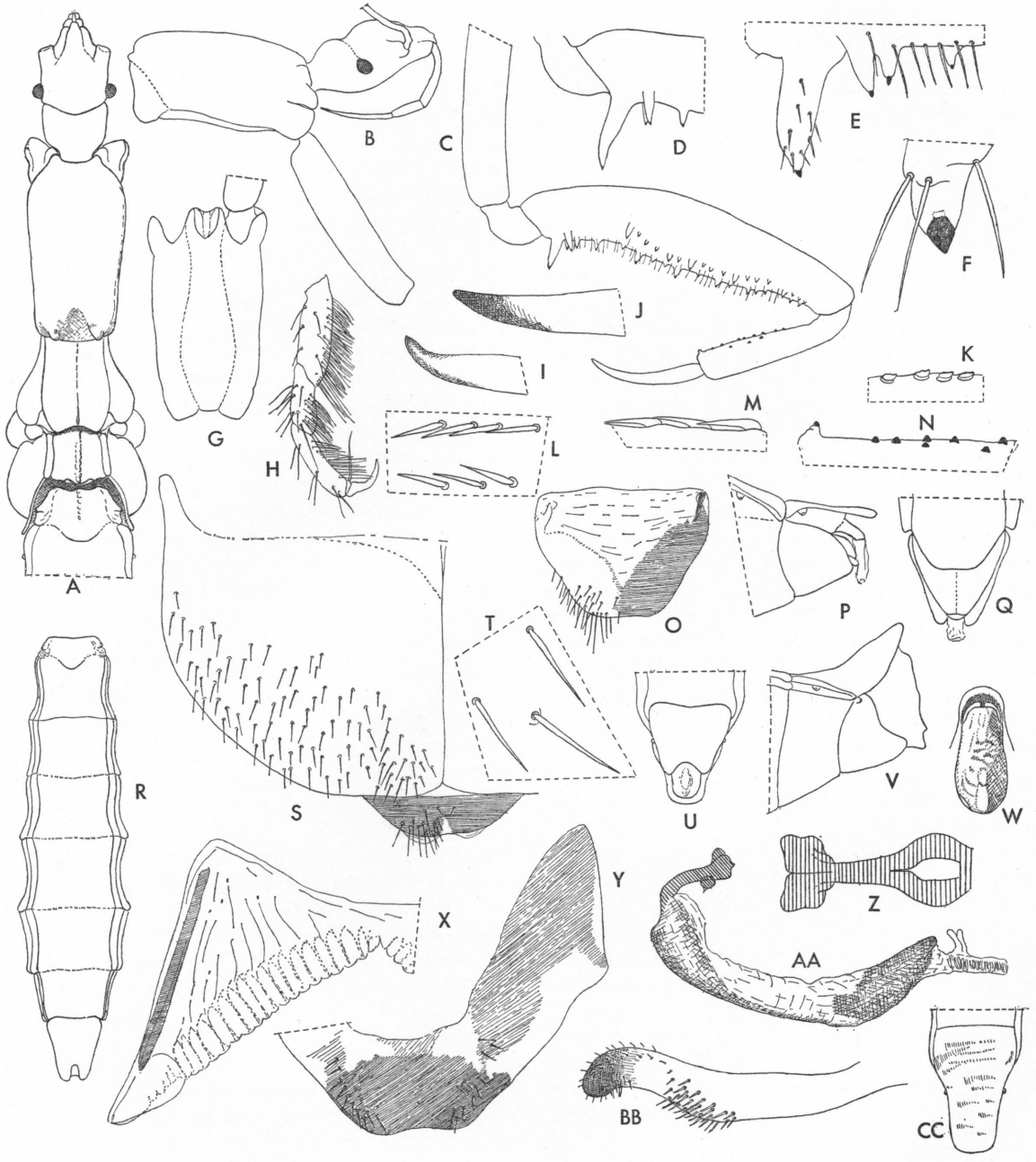
DESCRIPTION: Apterous. Medium-sized species (13–17 mm.).

Body surface dull, not tuberculate. Setae simple, relatively long and numerous; modified setae pointed, scalelike on under surface of head and thorax. General color castaneous, with irregular stramineous to piceous pattern elements.

Head with anteocular region longer than postocular, latter rather abruptly narrowed posteriorly in dorsal view. Clypeus and labrum not spined. Rostrum slender, bent between first and second segments, first and third segments of about equal length, second much shorter. Eyes very small, remote from level of dorsal and ventral surfaces of head. Interocular furrow originating at level of posterior border of eyes, strongly curved backward. Antennae inserted somewhat before middle of anteocular region.

Pronotum subcylindrical, somewhat narrowed posteriorly, not covering mesonotum, posteriorly with 1+1 short projections; hind lobe not distinct. Mesonotum slightly longer than wide, metanotum subquadrate, shorter than mesonotum, both combined not so long as pronotum.

Forelegs stout. Fore femur with two series of spiniferous processes, their apical processes very short, conical. Posteroventral series beginning at base of article; basal process much larger than others, various short bristles dispersed over surface of process; remaining processes of series medium-sized or small. Anteroventral series beginning almost at level of base of posteroventral series, widely interrupted at base, consisting of medium-sized and short processes. Tibia about half as long as femur, ventrally with two very irregular series of strongly sclerotized, small denticles, apical denticle inserted on short projection. Tarsus about two-thirds as long as tibia, curved, stout at base, not segmented, gradually narrowed toward apex, ending in sharp


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
AA
BB
CC

point; claws not developed; base of tarsus ventrally with extremely small, adpressed, knifelike setae, visible only under very high magnification, a few minute bristles scattered on surface of tarsus. Mid and hind legs without special characters, rather short and stout, their setae simple; tarsi three-segmented, basal segment longest, second very short, third slightly shorter than first. Claws slender, simple.

Abdomen about as long as head and thorax together, slightly widened at middle; connexival margins slightly undulate. Spiracles situated on inconspicuous projections.

Male: Seventh tergite completely covering pygophore from above. Eighth sternite large, fully exposed. Phallus symmetrical. Basal plates short, fused for most of their length. Phallosoma irregularly elongate-subcylindrical, sclerotized ventrally on basal two-thirds, completely sclerotized on apical third, somewhat projected distally; posterior opening directed posteroventrally. Endosoma membranous, tubular, with some small, basal projections. Parameres subcylindrical, with short setae.

Female: Eighth tergite large, horizontal, emarginate at apex. Ninth tergite small, situated below eighth, only its extreme apex visible from above. Gonocoxites separated; gonapophyses fused. Syngonapophysis truncate apically.

TYPE SPECIES: *Tubuataita galatea*, new species.

ETYMOLOGY: From Tubuai Island and Mt. Taita, where the only species was collected.

DISTRIBUTION: Austral Islands.

OBSERVATIONS: *Tubuataita* is possibly related to the Norfolk Island *Leaylia*, with which it shares such characters as the general aspect of the forelegs, the posterolateral projections of the hind border of the pronotum, and the simple structure of the phallus. *Tubuataita* differs from *Leaylia* by its shorter fore tarsus and the loss of the claws, the much more slender, curved rostrum, and the much smaller subhorizontal ninth tergite of the female, mostly covered by the eighth; this tergite is large and vertical in *Leaylia*. *Tubuataita* seems to be the more specialized of the two.

Tubuataita galatea, new species

Figure 181A–Z, AA–CC

DESCRIPTION: Length of male, 13.5; of female, 16–17 mm.; male: head, 1.9; pronotum, 2.3; mesonotum, 1.05; metanotum, 0.75; and abdomen, 7.5 mm.

General color castaneous; head, thorax, and abdomen faintly mottled with stramineous and piceous. Head flavescent on ventral surface; rostrum and antennae testaceous. Forelegs stramineous; coxa with one large, longitudinal, fuscous fascia; femur with about three wide, incomplete, transverse annuli and numerous more or less distinct, small, round spots dark; spiniferous processes flavescent; tibiae with two or three not very conspicuous wide dark annuli; tarsus uniformly testaceous. Coxae and trochantera of mid and hind legs dark, mottled with flavescent; femora dark, with three to five not invariably very distinct, narrow, flavescent annuli; tibiae flavescent, on basal third with a few dark annuli. Body surface more or less strongly rugose, setae conspicuous, golden colored.

Head and rostrum as given in generic description and shown in figure 181A, B; rostrum and antennae polished. Anteocular por-

FIG. 181 (OPPOSITE PAGE). *Tubuataita galatea*. A. Anterior portion of body of male, dorsal view. B. Head and prothorax of male, side view. C. Foreleg of male. D. Base of fore femur of female. E. Base of fore femur of nymph. F. Apex of basal projection of fore femur of nymph, high magnification. G. Prothorax, ventral view. H. Hind tarsus. I. Apex of fore tarsus of nymph. J. Apex of fore tarsus of male. K. Worn spines of under surface of fore tarsus of male. L. Spines of under surface of fore tarsus of nymph. M. Spines of under surface of fore tarsus of female. N. Spines of under surface of fore tibia. O. Syngonapophysis. P. Genital region of female, lateral view. Q. Genital region of female, seen from below. R. Abdomen of female, dorsal view. S. Gonocoxite with fused gonapophyses. T. Setae of eighth sternite of male. U. Genital region of male, ventral view. V. Apex of abdomen of male, lateral aspect. W. Genital region of male, seen from behind. X. Posterior gonapophysis. Y. Ninth tergite of female, as seen on slide mount. Z. Articulatory apparatus. AA. Phallus of male, side view. BB. Paramere. CC. Seventh tergite of male, seen from above.

tion rather strongly convex above. Eyes of identical small size in both sexes. Antennae bare; length of first segment (male), 6 mm.; relative length of segments, 1/0.75/0.04/?. Under surface of head with numerous minute scalelike setae.

Thorax as given in generic description and shown in figure 181A, B, G. Pronotum convex, impressed in center before posterior margin, 1+1 short projections at sides of impression. Median sclerite of ventral surface of prothorax covered with very numerous minute, scalelike setae. Shape of mesothorax and metathorax as illustrated, former with a very faint, latter with a distinct, median longitudinal carina.

Forelegs stout. Coxa as long as prothorax in lateral view (fig. 181B). Shape and proportion of other articles as given in generic description and shown in figure 181C. Posteroventral series of spiniferous processes beginning virtually at base of article, composed of one large basal process, shorter than diameter of segment in male (fig. 181C), as long as this diameter in female (fig. 181D); remainder of series composed of five or six medium-sized, and about 15 small and very small, processes. Anteroventral series with one medium-sized process basad of interruption; remainder composed of four or five medium-sized and about 12 small processes. Tibia as given in generic description, with about 12 denticles (fig. 181C, N). Tarsus as given in generic description and shown in figure 181C, J, K, M. Posterior femora attaining apex of abdomen or surpassing it by not more than 1 mm. Tarsi as given in generic description and shown in figure 181H.

Abdomen as given in generic description and shown in figure 181R, similar in both sexes; basal tergite as shown in figure 181A. Rugosity more pronounced on dorsal surface of abdomen than on rest of body. All sternites carinate longitudinally along middle. Setae of sternites as shown in figure 181T.

Male: Seventh tergite (fig. 181CC) tongue-shaped, rounded-truncate apically, somewhat elevated in lateral view. Eighth sternite large, salient at sides below, rather strongly emarginate at middle (fig. 181U, V). Pygophore compressed laterally, its posterior border subvertical, of irregular outline in lateral view (fig. 181V), with one large and one small projection below (fig. 181W); upper margin of pygophore straight across, with a small triangular median process slightly recessed in relation to border of pygophore. Shape and chaetotaxy of parameres as shown in figure 181BB, their apex heavily pigmented. Phallus as shown in figure 181AA; basal plates as shown in figure 181Z. Phallobase as illustrated. Endosoma (partly evaginated) with 1+1 finger-like projections near its base (fig. 181AA).

Female: Genital region as given in generic description and shown in figure 181P-R. Eighth tergite subtrapezoidal, horizontal, deeply notched apically; ninth tergite very small, rounded apically, recessed below apices of eighth tergite. Genital sclerites as shown in figure 181S, X, Y.

MATERIAL EXAMINED: Austral Islands: Tubuai Island: southwest ridge of Mt. Taita, August 20–23, 1934, beating ferns, 1200 feet (E. C. Zimmerman; Bernice P. Bishop Museum), one male holotype, one female allotype, one female paratype, one nymph; (E. C. Zimmerman; the American Museum of Natural History), one female paratype.

OBSERVATIONS: One fifth-instar nymph has been examined. It agrees with the adult in all essential characters, such as coloring, the shape of the head, and the structure of the forelegs (fig. 181E, F, I, L).

METAPTERINI INCERTAE SEDIS

Emesa mantiformis Mulsant and Rey

Emesa mantiformis MULSANT AND REY, 1873, p. 3, fig. 12.

The description of this large and slender species (length, 32 mm.) is indicative of its being a metapterine. The authors indicate, with some doubt, Languedoc, France, as *patria* of this species, and stress the resemblance of their *mantiformis* to various species now included in *Emesaya*. The description and accompanying figure, which disagree in several points, are not sufficient for *mantiformis* to be placed generically and thus for one to guess its probable geographical origin.

DISTRIBUTION: France?

TYPE: Unknown.

ROSLANIA DISTANT

Roslania DISTANT, 1913, p. 165.

The original description which, together

with the illustration of the only species included, places the genus in the Metapterini, follows: "Head not or very slightly narrowed at base, very slightly transversely impressed between eyes, anteocular and postocular areas nearly subequal in length; rostrum reaching the anterior coxae, first joint not reaching eyes; antennae long, slender, first joint nearly as long as intermediate femora, subequal to second; pronotum a little shorter than anterior coxae, very slightly broader than base of head and attenuated posteriorly, mesonotum very strongly attenuated anteriorly, discally depressed from a little behind apex; apterous; abdomen above with the lateral margin recurved and ridged; anterior femora distinctly longer than the anterior coxae, spined beneath on their anterior halves; anterior tibiae less than half the length of the femora; anterior tarsi single-jointed, only moderately shorter than the femora, posterior legs longer than the intermediate legs; posterior femora about as long as the abdomen; intermediate and posterior tarsi two-jointed, first joint moderately globose.

Allied to *Ischnonyctes* Stal."

The fact that the type (*R. insularis* Distant) is a nymph was established by Bergroth (1915) and confirmed by China (*in litt.*).

Bergroth (1915) considered *Roslania* to be identical with *Ischnonyctes*, but, as long as adults cannot be examined, I prefer to consider the genus as of uncertain status.

TYPE SPECIES: *Roslania insularis* Distant.

DISTRIBUTION: Oriental Region.

Roslania insularis Distant

Roslania insularis DISTANT, 1913, p. 166, pl. 12, fig. 7.

DISTRIBUTION: Seychelles.

TYPE: Nymph, British Museum (Natural History).

Schidium annulipes Villiers

Schidium annulipes VILLIERS, 1949a, p. 381, figs. 299, 302, 311.

The semioval eighth tergite completely covering the ninth is unique for *Schidium*, as also stated by the author of the species, which I could not examine. Until additional data become available, I am inclined to exclude *annulipes* from *Schidium*.

DISTRIBUTION: Congo (Léopoldville).

TYPE: Female, Musée Royal de l'Afrique Centrale.

Schidium phasma (Distant)

Ghilianella phasma DISTANT, 1903e, p. 211, fig. 149.

Schidium phasma: BERGROTH, 1916, p. 230.

The conspicuous body granulation of this insect makes its placement in *Schidium* highly doubtful; a re-examination of *phasma* is imperative.

DISTRIBUTION: Burma.

TYPE: British Museum (Natural History).

EMESINAE INCERTAE SEDIS

Emesa filum Fabricius

Cimex filum FABRICIUS, 1777, p. 301.
Gerris filum: FABRICIUS, 1794, p. 191.
Emesa filum: FABRICIUS, 1803, p. 263.

This species is unidentifiable. The type is not extant.

DISTRIBUTION: East Indies.

TYPE: Lost.

Emesa filum Brullé

Emesa filum BRULLE, 1836, p. 312, fig.

This species is unidentifiable but is not the same as Fabricius' *Emesa filum*. Blanchard (1840) briefly described as *Emesa filum* a species he identified with that of Brullé.

DISTRIBUTION: East Indies; Mauritius.

TYPE: None.

Ploiaria pallida Guérin-Méneville

Ploiaria pallida GUÉRIN-MÉNÉVILLE, 1838 (1829–1845), p. 350, fig.
Ploiaria (Emesa) pallida: GUÉRIN-MÉNÉVILLE, 1857, p. 413.
Palacus pallidus: LETHIERRY AND SEVERIN, 1896, p. 74.

McAtee and Malloch (1925) believed that the species was described originally by Guérin-Méneville in 1857. They apparently ignored the earlier description (Guérin-Méneville, 1838), although the latter was correctly reported by Lethierry and Severin (1896).

It is impossible to place this species generically.

DISTRIBUTION: Cuba.

TYPE: Unknown.

BIBLIOGRAPHY

AMYOT, C. J. B., AND J. C. A. SERVILLE
1843. Histoire naturelle des insectes. Hémiptères. Paris. lxxvi+675+6 pp., 12 pls.

BACHOFEN-ECHT, A.
1949. Der Bernstein und seine Einschlüsse. Vienna, 204 pp., 188 figs.

BAERENSPRUNG, F.
1860. Hemiptera Heteroptera Europaea systematice disposita. Berliner Ent. Zeitschr., vol. 4 (app.), pp. 1–25.

BAKER, C. F.
1910. California Emesidae (Hemiptera). Pomona College Jour. Ent., vol. 2, pp. 225–227, 1 fig.

BANKS, C. S.
1909. Rhynchota Palawanica. Part I: Heteroptera. Philippine Jour. Sci., vol. 4, no. 6, pp. 553–593, 2 pls.

BANKS, NATHAN
1909. Notes on our species of Emesidae. Psyche, vol. 16, no. 3, pp. 43–48, 2 figs.
1912. A new species of Emesidae from Vermont. *Ibid.*, vol. 19, no. 3, p. 97.

BARBER, H. G.
1914. Insects of Florida. II. Hemiptera. Bull. Amer. Mus. Nat. Hist., vol. 33, pp. 495–536.
1923. A preliminary report on the Hemiptera-Heteroptera of Porto Rico collected by the American Museum of Natural History. Amer. Mus. Novitates, no. 75, pp. 1–13.
1939. Insects of Porto Rico and the Virgin Islands—Hemiptera-Heteroptera (excepting the Miridae and Corixidae). *In* Scientific Survey of Porto Rico and the Virgin Islands, vol. 14, pt. 3. New York, pp. 263–441, 36 figs.
1954. A report on the Hemiptera Heteroptera from the Bimini Islands, Bahamas, British West Indies. Amer. Mus. Novitates, no. 1682, pp. 1–18, 3 figs.

BERG, C.
1884. Addenda et emendanda ad Hemiptera Argentina. An. Soc. Cient. Argentina, vol. 17, pp. 97–118.
1900. Tres Reduviidae novae argentinae. Comun. Mus. Nac. Buenos Aires, vol. 1, no. 6, pp. 187–190.

BERGEVIN, E. DE
1930–1932a. Liste des Hémiptères. Risultati zoologici della missione inviate dalla R. Societá Geografica Italiana per l'esplorazione dell'oasi di Giarabub. Ann. Mus. Civ. Stor. Nat. Genova, vol. 55, pp. 29–39, 2 figs.
1930–1932b. Resultats hemiptérologiques. Spedizione scientifica all'oasi di Cufra. (Marzo-luglio 1931). *Ibid.*, vol. 55, pp. 422–430, 1 fig.

BERGROTH, E.
1887. Note sur deux espèces d'Hémiptères (*Ploearia*). Ann. Soc. Ent. France, ser. 6, vol. 7, p. xvii.
1903a. Descriptions préliminaires de Ploeariinae d'Afrique. Rev. d'Ent., vol. 22, pp. 8–11.
1903b. Novum genus Ploeariinarum. *Ibid.*, vol. 22, pp. 12–13.
1906a. Zur Kenntnis der Ploeariinen. Verhandl. K. K. Zool.-Bot. Gesell. Wien, vol. 56, pp. 305–321.
1906b. Neue Hemipteren aus Madagaskar. II. Ann. Soc. Ent. Belgique, vol. 50, pp. 254–270, 3 figs.
1909. *Ploeariodes* B. White and *Ploeariola* Reut. (Hemiptera-Heteroptera, Reduviidae). Rev. Russe Ent., vol. 9, p. 324.
1911. New Neotropical Ploeariinae. Psyche, vol. 18, pp. 15–20.
1912. New or little known Hemiptera, chiefly from Australia, in the American Museum of Natural History. Bull. Amer. Mus. Nat. Hist., vol. 31, pp. 343–348.
1914a. Heteropterous Hemiptera from Natal and Zululand collected by Dr. I. Trägårdh. Göteborgs K. Vetensk. Handl., vol. 16, no. 2, pp. 3–16.
1914b. Three new Heteroptera from Ceylon. Ann. Soc. Ent. Belgique, vol. 58, pp. 183–188.
1915. Some Javanese Hemiptera collected by E. Jacobson and Th. H. MacGillavry. Zool. Meded., vol. 21, pp. 109–123.
1916. New and little-known heteropterous Hemiptera in the United States National Museum. Proc. U. S. Natl. Mus., vol. 51, no. 2150, pp. 215–239.
1922a. Two new American Ploeariinae (Hem. Reduviidae). Konowia, vol. 1, nos. 4–5, pp. 218–220.
1922b. The American species of *Ploeariola* Reut. (Hem. Reduviidae). Notulae Ent., vol. 2, pp. 49–51, 77–81.
1923. Hemiptera from Juan Fernández and Easter Island. *In* Skottsberg, C., The natural history of Juan Fernández and Easter Island. Uppsala, vol. 3, Zoology, pp. 395–402, 3 figs.
1926. Hemiptera Heteroptera from New Zealand. Trans. New Zealand Inst., vol. 57, pp. 671–684.

BLACKBURN, T.
1881. [Descriptions.] *In* White, F. B., Descriptions of new species of heteropterous Hemiptera collected in the Hawaiian islands by the Rev. T. Blackburn. No. 3. Ann. Mag. Nat. Hist., ser. 5, vol. 7, p. 59.
1889. Notes on the Hemiptera of the Hawaiian Islands. Proc. Linnean Soc. New South Wales, ser. 2, vol. 3, pp. 343–354.

BLANCHARD, E.
1840. Histoire naturelle des insectes Orthoptères, Névroptères, Hémiptères, Hyménoptères, Lépidoptères et Diptères. Paris, vol. 3, 672 pp., 155 pls.

BLATCHLEY, W. S.
1925. Some additional new species of Heteroptera from the southern United States with characterization of a new genus. Ent. News, vol. 36, pp. 45–52.
1926. Heteroptera or true bugs of eastern North America with especial reference to the faunas of Indiana and Florida. Indianapolis, 1116 pp., 215 figs., 12 pls.
1928. Notes on the Heteroptera of eastern North America with descriptions of new species, I. Jour. New York Ent. Soc., vol. 34, pp. 1–23.

BONHAG, P. F., AND J. R. WICK
1953. The functional anatomy of the male and female reproductive systems of the milkweed bug, *Oncopeltus fasciatus* (Dallas) (Heteroptera: Lygaeidae). Jour. Morph., vol. 93, no. 2, pp. 177–284, 68 figs.

BONNAMOUR, S.
1921. Note sur l'habitat et les moeurs d'*Emesodema domestica* Scopoli (Hemiptera). Ann. Soc. Linnéenne Lyon, vol. 67, pp. 79–81.

BREDDIN, G.
1904. Neue Rhynchotenausbeute aus Süd-Amerika. Soc. Ent., Stuttgart, vol. 18, no. 19, pp. 147–149.
1909. Rhynchoten von Ceylon, gesammelt von Dr. Walter Horn. Ann. Soc. Ent. Belgique, vol. 53, pp. 250–309, 27 figs.
1912. Reduviiden von Ceylon, gesammelt von Dr. W. Horn. *Ibid.*, vol. 56, pp. 404–414.

BROWN, H. P., AND D. W. LOLLIS
1963. Observations on the life-history and behavior of the thread-legged bug *Emesaya b. brevipennis* (Say), (Hemiptera: Ploiariidae). Proc. Oklahoma Acad. Sci., vol. 43, pp. 88–90.

BROWN, R. W.
1956. Composition of scientific words. Revised edition. Baltimore, 882 pp.

BRULLÉ, A.
1836. [Descriptions.] *In* Audouin, J. V., Orthoptères et Hémiptères. Histoire naturelle des insectes, traitant de leur organisation et de leurs moeurs en général, par M. Audouin . . . et comprenant leur classification et la description des espèces, par M. A. Brullé. Paris, vol. 9, 415 pp., 56 pls.

BUTLER, E. A.
1923. A biology of the British Hemiptera-Heteroptera. London, viii+682 pp., 7 pls.

CARAYON, J.
1950a. Une localité des environs d'Albi (Tarn) riche en Hémiptères rares ou peu communs. Feuille Nat., new ser., vol. 5, nos. 7–8, pp. 61–65, 1 fig.
1950b. Nombre et disposition des ovarioles dans les ovaires des Hémiptères-Hétéroptères. Bull. Mus. Natl. d'Hist. Nat., Paris, ser. 2, vol. 22, no. 4, pp. 470–475.
1950c. Caractères anatomiques et position systématique des Hémiptères Nabidae (Note préliminaire). *Ibid.*, ser. 2, vol. 22, no. 1, pp. 95–101, 3 figs.

CHAMPION, G. C.
1898a. Rhynchota. Hemiptera-Heteroptera. *In* Godman, F., and O. Salvin, Biologia Centrali-Americana. London, vol. 2, xvi+416 pp., 22 pls.
1898b. *Emesa mantis*, Fabr.: synonymical note. Ent. Monthly Mag., vol. 34, p. 258.

CHARBONNIER, H. J.
1903. On the habits of *Ploiaria culiciformis* (DeG.). Ent. Monthly Mag., vol. 39, pp. 123–124.

CHEESMAN, L. E.
1927. A new species of Reduviidae from the south-east Pacific. Ann. Mag. Nat. Hist., ser. 9, vol. 19, pp. 95–97, 4 figs.

CHINA, W. E.
1924. Description of a new species of reduviid. *In* Kemp, S., Rhynchota of the Sivu Cave, Garo Hills, Assam. Rec. Indian Mus., vol. 26, pp. 96–97.
1925. Some new or little known species of Hemiptera from Grahamstown, S. Africa. Rec. Albany Mus., Grahamstown, vol. 3, no. 4, pp. 268–276, 5 figs.
1926a. A note on the habits of *Myiophanes tipulina* Reuter (Reduviidae, Heteroptera). Ent. Monthly Mag., vol. 62, pp. 21–22.
1926b. The egg of *Ploiariola culiciformis* De Geer (Heteroptera, Reduviidae). *Ibid.*, vol. 62, pp. 265–266, 3 figs.

1930. Hemiptera Heteroptera. *In* Insects of Samoa. London, vol. 2, no. 3, pp. 81–162, 28 figs.
1938. Die Arthropodenfauna von Madeira nach den Ergebnissen der Reise von Prof. Dr. O. Lundblad Juli-August 1935. Terrestrial Hemiptera. Arkiv Zool., vol. 30A, 68 pp., 23 figs., 1 pl.
1943. The generic names of the British Hemiptera-Heteroptera, with a check list of the British species. The generic names of British insects. London, vol. 8, pp. 211–342.

CHOBAUT, A.
1923. Sur le *Stenolemus novaki* Horváth (Hem., Reduviidae). Bull. Soc. Ent. France, 1923, p. 81.

COSTA, A.
1852. Cimicum regni Neapolitani centuriae. Centuria 3–4. London, 73 pp., 3 pls.
1863. Additamenta ad centurias cimicum Regni Neapolitani. Atti R. Ist. Incor. Sci. Nat. Napoli, vol. 10, pp. 329–367, pls. 1–3.

DAVIS, N. T.
1961. Morphology and phylogeny of the Reduvioidea (Hemiptera: Heteroptera). Part II. Wing venation. Ann. Ent. Soc. Amer., vol. 54, pp. 340–354, 63 figs.

DE GEER, C.
1773. Mémoires pour servir à l'histoire des insectes. 3. Stockholm, viii+696 pp., pls. 1–44.

DICKER, G. H. L.
1941. Notes on some Hemiptera-Heteroptera taken in the Reading District during 1940. Ent. Monthly Mag., vol. 77, pp. 101–104.

DISPONS, P.
1951. Un *Ploearia* nouveau de l'Afrique du Nord. Rev. Française Ent., vol. 18, no. 3, pp. 169–171, 5 figs.
1953. Etude sur le genre *Ischnonyctes* Stål. Biologie d'*Ischnonyctes barbarus* (Lucas) (Hemiptera Emesinae). *Ibid.*, vol. 20, no. 4, pp. 231–252, 35 figs.
1954. Observations sur les Emesinae d'Afrique du Nord (*Ploearia* et *Ischnonyctes*) (Hem. Reduviidae). *Ibid.*, vol. 21, no. 2, pp. 144–146, 6 figs.
1955. Les Réduviides de l'Afrique nord-Occidentale. Biologie et biogéographie. Mém. Mus. Natl. d'Hist. Nat., ser. A, zool., vol. 10, no. 2, pp. 93–240, 116 figs., 4 pls.
1958. Deux espèces nouvelles du genre *Empicoris* Wolff (Hemiptera, Heteroptera, Emesinae). Cahiers Nat., new ser., vol. 14, pp. 83–84, 2 figs.
1960a. Commentaires sur la famille des Reduviidae (Hemiptera Heteroptera). Rev. Française Ent., vol. 27, no. 4, pp. 291–305, 5 figs.
1960b. *Ploearia soudanica* nov. sp. (Hemiptera-Heteroptera: Reduviidae-Emesinae). Bull. Inst. Français Afrique Noire, ser. A, vol. 22, no. 4, pp. 1312–1314, figs.
1963. Emesinae et Saicinae du Maroc (Hemiptera Heteroptera Reduviidae). Bull. Soc. Sci. Nat. Phys. Maroc, vol. 41, pp. 195–207, 19 figs.

DISPONS, P., AND W. STICHEL
1959. Fam. Reduviidae Lat. Subfam. Emesinae A. & S. *In* Stichel, W., Illustrierte Bestimmungstabellen der Wanzen. II. Europa. Berlin, vol. 3, nos. 3–4, pp. 82–106, figs. 7–104.

DISTANT, W. L.
1903a. Undescribed oriental Rhynchota. Entomologist, vol. 36, pp. 1–2.
1903b. Rhynchotal notes. XVI. Heteroptera: family Reduviidae (continued), Apiomerinae, Harpactorinae and Nabinae [and supplement]. Ann. Mag. Nat. Hist., ser. 7, vol. 11, pp. 245–258.
1903c. Report on the Rhynchota. Part I. Heteroptera. Fasc. Malayan Zool., vol. 1, pp. 219–272, pls. 15, 16.
1903d. Rhynchotal miscellanea (second series). Ann. South African Mus., vol. 3, pp. 43–62.
1903e. The fauna of British India. London, Rhynchota, vol. 2, xvii+503 pp., 319 figs.
1903f. Rhynchotal notes.—XVIII. Heteroptera. Ann. Mag. Nat. Hist., ser. 7, vol. 12, pp. 248–254.
1906. Oriental Reduviidae. *Ibid.*, ser. 7, vol. 18, pp. 363–371.
1909. Oriental Rhynchota Heteroptera. *Ibid.*, ser. 8, vol. 3, pp. 491–507.
1910. The fauna of British India. London, Rhynchota, vol. 5, xii+362 pp., 214 figs.
1913. Reports on the Percy Sladen Trust Expeditions to the Indian Ocean in 1905. Part 5, Rhynchota: Suborder Heteroptera. Trans. Linnean Soc. London, vol. 16, pp. 139–191, pls. 11–13.
1914. Rhynchota from New Caledonia and the surrounding islands. *In* Sarasin, F., and J. Roux, Nova Caledonia. Berlin, Zoologie, vol. 1, pp. 369–390, pls. 11–12.
1915. Some interesting Rhynchota from Bri-

tish India. Entomologist, vol. 48, pp. 8–9.
1919. Descriptions of new species and genera of the heteropterous family Reduviidae from British India. Ann. Mag. Nat. Hist., ser. 9, vol. 4, pp. 71–79.
1920. Rhynchota from New Guinea. Part I. Heteroptera. *Ibid.*, ser. 9, vol. 6, pp. 143–164.

DOHRN, A.
1859. Catalogus hemipterorum. Stettin, 112 pp.
1860. Beiträge zu einer monographischen Bearbeitung der Familie der Emesina. Linnea Ent., vol. 14, pp. 206–255, pl. 1.
1863. Beiträge zu einer monographischen Bearbeitung der Familie der Emesina (Zweites Stück). *Ibid.*, vol. 15, pp. 42–76.

DOUGLAS, J. W., AND J. SCOTT
1868. List of the captures of Hemiptera in Palestine and Syria; together with descriptions of several new species. Ent. Monthly Mag., vol. 5, pp. 135–139.

DOVER, C.
1929. [Notes.] *In* Boden-Kloss, C., Fauna of Batu Caves, Selangor. Jour. Federated Malay States Mus., vol. 14, pp. 327–387.

DOWNES, W.
1924. [Notes on *Ploiariola vagabunda* var. *pilosa* Fieber.] Proc. Ent. Soc. British Columbia, vol. 21, p. 28.
1927. A preliminary list of the Heteroptera and Homoptera of British Columbia. *Ibid.*, vol. 23, pp. 1–22.

DUBOIS, M.
1888. Catalogue des Hémiptères de la Somme. Amiens, pp. 1–82.

DUPUIS, C.
1955. Les génitalia des Hémiptères Hétéroptères (génitalia externes des deux sexes: voies ectodermiques femelles). Mém. Mus. Natl. Hist. Nat., ser. A., vol. 6, pp. 183–278, 17 figs.
1963. Progrès récents de l'étude des génitalia des Hétéroptères (étude bibliographique critique). Paris, pp. 1–100.

ELKINS, J. C.
1951a. A new species of *Metapterus* (Hemiptera, Reduviidae). Field and Lab., vol. 19, no. 2, pp. 90–93, 9 figs.
1951b. A female neallotype of *Emesaya incisa* McAtee & Malloch (Hemiptera, Reduviidae). *Ibid.*, vol. 19, no. 2, pp. 94–95, 2 figs.
1951c. The Reduviidae of Texas. Texas Jour. Sci., vol. 3, no. 3, pp. 407–412.
1953. Notes on some Texas Reduviidae (Hemiptera, Reduviidae). Jour. Kansas Ent. Soc., vol. 26, no. 4, pp. 137–140, 8 figs.
1962. Three new saicine genera (Hemiptera: Reduviidae). *Ibid.*, vol. 35, no. 4, pp. 421–429, 20 figs.

ERICHSON, W. F.
1842. Beitrag zur Insecten-Fauna von Vandiemensland, mit besonderer Berücksichtigung der geographischen Verbreitung der Insecten. Arch. Naturgesch., vol. 8, no. 1, pp. 83–287, pls. 4, 5.

ESAKI, T.
1926. [A review of Mr. Tamao Fukui's Illustrated monograph of Japanese Reduviidae.] Kontŷu, vol. 1, pp. 87–89.

ESPÍNOLA, H. N., AND J. E. DA SILVA
1963. *Stenolemus lenti* sp. n. (Hemiptera, Reduviidae, Emesinae). Rev. Brasileira Biol., vol. 23, no. 1, pp. 81–84, 6 figs.

ESPÍNOLA, H. N., S. H. XAVIER, AND S. S. MATTOS
1961. *Stenolemus wygodzinskyi* sp. n. (Hemiptera, Reduviidae). Rev. Brasileira Biol., vol. 21, no. 1, pp. 117–120, 5 figs.

FABRICIUS, J. C.
1777. Genera insectorum. Kiel, 14+310 pp.
1794. Entomologia systematica. Copenhagen, vol. 4, [6]+472+[5] pp.
1803. Systema rhyngotorum. Brunswick, vi+314 pp.

FALLÉN, C. F.
1807. Monographia cimicum. Copenhagen, 123 pp.

FERNANDO, W.
1964. New species of insects from Ceylon (5). Ceylon Jour. Sci., biol. sci., vol. 3, no. 1, pp. 123–130, pls. 1–4.

FIEBER, F. X.
1860–1861. Die europäischen Hemiptera. Halbflügler (Rhynchota Heteroptera). Nach der analytischen Methode bearbeitet. Vienna, 444 pp., 2 pls.

FRACKER, S. B., AND R. L. USINGER
1949. The generic identification of Nearctic reduviid nymphs. Ann. Ent. Soc. Amer., vol. 42, pp. 273–278.

FUKUI, T.
1926. [Illustrated monograph of Japanese Reduviidae (Hem.).] Kontŷu, vol. 1, pp. 7–18, 1 fig., 2 pls.

GILLETT, J. D.
1957. On the habits and life history of captive emesine bugs (Hemiptera: Reduviidae). Proc. Roy. Ent. Soc. London, ser. A., vol. 32, pp. 193–195.

GMELIN, J. F.
1788. Caroli a Linné Systema naturae. Editio

decima tertia, aucta, reformata. Leipzig, vol. 1, pt. 4, pp. 1517–2224.

GRAVELY, F. H.
1915. Notes on the habits of Indian insects, myriapods and arachnids. Rec. Indian Mus., vol. 11, pp. 483–539, pls. 22–25.

GRAY, G.
1832. [Descriptions.] *In* Griffith, E., Insecta. Animal Kingdom, London, vol. 15, pt. 2, pp. 1–796, 128 pls.

GREEN, E. E.
1913. Note on a web-spinning psocid. Spolia Zeylanica, vol. 8, pp. 71–72, 1 fig., 1 pl.

GRESSITT, J. L.
1961. Problems in the zoogeography of Pacific and Antarctic insects. Pacific Insects Monogr., vol. 2, pp. 1–94, 40 figs.

GUÉRIN-MÉNÉVILLE, F. E.
1829–1845. Iconographie du règne animal de G. Cuvier. Paris, vol. 3, Texte explicatif, Insectes, pp. 1–576.
1857. Animaux articulés à pieds articulés. *In* Sagra, R. de la, Histoire physique, politique et naturelle d l'Ile de Cuba. Paris, vol. 7, lxxxvi+868 pp.

HAGLUND, C. J. E.
1895. Beiträge zur Kenntnis der Insektenfauna von Kamerun. 4. Verzeichnis der von Yngve Sjöstedt im nordwestlichen Kamerungebiete angesammelten Hemipteren. Öfvers. Akad. Förhandl., 1895, fasc. 7, pp. 445–480.

HALDEMAN, S. S.
1847. Descriptions of several new species and one new genus of insects. Proc. Acad. Nat. Sci. Philadelphia, vol. 3, pp. 149–151.

HAVILAND, M. D.
1931. The Reduviidae of Kartabo, Bartica District, British Guiana. Zoologica, New York, vol. 7, no. 5, pp. 129–154, 15 figs.

HEIDEMANN, O.
1901. Papers from the Hopkins Stanford Galapagos Expedition, 1898–1899. Entomological results (I). Hemiptera. Proc. Washington Acad. Sci., vol. 3, pp. 363–370.

HEINEKEN, C.
1830. Descriptions of a new genus of Hemiptera, and of a species of Hegeter. Zool. Jour., vol. 5, pp. 35–40, pl. 2, fig. 5.

HENNIG, W.
1953. Kritische Bemerkungen zum phylogenetischen System der Insekten. Beitr. Ent., vol. 3, Sonderheft, pp. 1–85.
1960. Die Dipteren-Fauna von Neuseeland als systematisches und tiergeographisches Problem. *Ibid.*, vol. 10, nos. 3–4, pp. 221–329, 27 figs.

HERRICH-SCHÄFFER, G. A. W.
1835. Nomenclator entomologicus. Regensburg, vol. 1, 116 pp.
1853. Die wanzenartigen Insekten. Nuremberg, vol. 9, iv+348 pp., 36 pls.

HESSE, A. J.
1925. A list of the heteropterous and homopterous Hemiptera of South-West Africa. Ann. South African Mus., vol. 23, no. 1, pp. 1–190, 8 pls.

HICKS, E. A.
1959. Check-list and bibliography on the occurrence of insects in birds' nests. Ames, Iowa, 681 pp.

HOBERLANDT, L.
1942. Heteroptera Madagascariensa in Museo Pragensis. III. Ad Ploiariinarum cognitionem. Acta Ent. Mus. Natl. Prague, vol. 20, pp. 135–150, 28 figs.
1955. Results of the Zoological Scientific Expedition of the National Museum in Praha to Turkey. Vol. 18. Hemiptera IV. Terrestrial Hemiptera-Heteroptera of Turkey. *Ibid.*, suppl. 3, 264 pp., 66 figs.

HOFFMANN, W. E.
1944. Catalogue of the Reduviidae of China. Lingnan Univ. Sci. Bull., no. 10, iv+80 pp.

HORVÁTH, G.
1887. Notes additionelles sur les Hémiptères-Hétéroptères des environs de Gorice (Illyrie). Rev. d'Ent., vol. 6, pp. 68–75, figs. 2–4.
1888. Matériaux pour servir a l'étude des Hémiptères de la faune paléarctique. *Ibid.*, vol. 7, pp. 168–198, pl. 1.
1892. Chasses hivernales dans le midi de la France. *Ibid.*, vol. 11, pp. 128–140.
1902. Descriptions of new Hemiptera from New South Wales. Termesz. Füz., vol. 25, pp. 601–612.
1910. Trois Reduvides nouveaux d'Afrique. Bull. Mus. Natl. d'Hist. Nat., Paris, vol. 16, no. 910, pp. 271–273.
1914a. Miscellanea hemipterologica. XV. Stenolaemaria nova. Ann. Mus. Natl. Hungarici, vol. 12, pp. 639–652, 9 figs.
1914b. Deux Hétéroptères nouveaux de France et de Corse. Bull. Soc. Ent. France, 1914, pp. 88–90.
1922. Species palaearcticae generis *Stenolaemus* Sign. Ann. Mus. Natl. Hungarici, vol. 19, pp. 103–106, 8 figs.
1924. Species aegyptiacae generis *Stenolaemus*

Sign. (Hemipt.). Bull. Soc. Roy. Ent. Egypte, pp. 84–90, 2 figs.

HOWES, P. G.
1919. Insect behavior. Boston, pp. 1–176, illus.

HUSSEY, R. F.
1921. Distributional notes on Hemiptera, with the description of a new *Gerris*. Psyche, vol. 28, no. 1, pp. 8–15, 4 figs.
1955. Some records of Hemiptera new to Florida. Quart. Jour. Florida Acad. Sci., vol. 18, no. 2, pp. 120–122.

JAKOVLEV, B. E.
1874. [Materials for the entomological fauna of European Russia.] Trud. Russkago Ent. Obshch., vol. 7, pp. 7–43, pl. 1.
1906a. Aperçu des espèces du genre *Ploeariola* Reut. (Hemiptera-Heteroptera, Reduviidae) de la faune de la Russie. Rev. Russe Ent., vol. 6, pp. 157–158.
1906b. Les Hémiptères-Hétéroptères du gouvernement de Tauride. Horae Soc. Ent. Rossicae, vol. 37, pp. 220–246.

JEANNEL, R.
1919. Insectes Hémiptères. III. Henicocephalidae et Reduviidae. *In* Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–1912). Résultats Scientifiques. Paris, pp. 131–314, 30 figs., 8 pls.

KARSCH, F.
1892. Kurze Charakteristik neuer Wanzen aus Kamerun, gesammelt durch Herrn Dr. Paul Preuss. Ent. Nachr., vol. 18, pp. 129–136.

KEMP, S.
1924. Rhynchota of the Siju Cave, Garo Hills, Assam. Rec. Indian Mus., vol. 26, pp. 93–97.

KIRIAKOFF, S. G.
1959. Aspects de la biogéographie moderne. I. La substance de la biogéographie et ses rapports avec les autres sciences biologiques. Naturwissenschaften, yr. 41, pp. 21–35.

KIRITCHENKO, A. N.
1928. Contribution à la faune des Hémiptères-Hétéroptères de la Crimée. VII. Rev. Russe Ent., vol. 22, nos. 1–2, pp. 129–132.
1951. [Heteroptera of the European U.S.S.R. (Hemiptera). Key and bibliography.] Keys to the fauna of the U.S.S.R., published by the Zoological Institute of the Academy of Sciences of the U.S.S.R. Leningrad, vol. 42, 423 pp., 416 figs.

KIRKALDY, G. W.
1899. Two new Rhynchota (Reduviidae and Corixidae) from Japan, and diverse notes. Entomologist, vol. 32, pp. 78–80.
1901. Six new Reduviidae from Sumatra. Notes Leyden Mus., vol. 23, no. 6, pp. 53–57.
1902. Hemiptera. *In* Fauna Hawaiiensis. Cambridge, vol. 3, pt. 2, pp. 93–174, pls. 4, 5.
1904. Bibliographical and nomenclatorial notes on the Hemiptera. No. 3. Entomologist, vol. 37, pp. 279–283.
1907. Notes on Central American hemipterous fauna. Canadian Ent., vol. 39, pp. 248–250.
1908a. A list of the described Hemiptera (excluding Aleyrodidae and Coccidae) of the Hawaiian Islands. Proc. Hawaiian Ent. Soc., vol. 1, no. 5, pp. 186–208, 3 figs., 1 pl.
1908b. A catalogue of the Hemiptera of Fiji. Proc. Linnean Soc. New South Wales, vol. 33, pp. 345–391, pl. 4.
1909. Hemiptera old and new. No. 2. Canadian Ent., vol. 41, no. 11, pp. 388–392.
1910. Supplement to Hemiptera. *In* Fauna Hawaiiensis. Cambridge, vol. 2, pt. 6, pp. 531–599.

KUSCHEL, G.
1951. [Note.] *In* Wygodzinsky, P., Contribución al conocimiento del género *Metapterus* Costa, 1860, de las Américas y de Juan Fernández (Hemiptera Reduviidae). Rev. Chilena Ent., vol. 1, p. 113.
1963. Problems concerning an Austral region. *In* Gressitt, J. Linsley (ed.), Pacific Basin biogeography. Honolulu, pp. 443–449.

LAPORTE, F. L. DE [COMTE DE CASTELNAU]
1832. Essai d'une classification systématique de l'ordre des Hémiptères (Hémiptères Hétéroptères, Latr.). Paris, 88 pp., 5 pls.

LATREILLE, A.
1802. Histoire naturelle, générale et particulière des crustacés et des insectes. Paris, vol. 3, xii+467 pp.
1804. *Op. cit.* Paris, vol. 12, 424 pp., pls. 94–97.

LESTON, D.
1957. Spread potential and the colonisation of islands. Syst. Zool., vol. 6, no. 1, pp. 41–46, 2 figs.

LETHIERRY, L., AND G. SEVERIN
1896. Catalogue général des Hémiptères. Brussels, vol. 3, pp. 1–275.

LHOSTE, J.
1939. Etudes biospéologiques. XI. Espèces africaines du genre *Bagauda* Bergroth (Hemiptera Reduviidae). Bull. Mus.

Roy. Hist. Nat. Belgique, vol. 15, no. 35, pp. 1–8, 10 figs.

LINDBERG, H.
1932. Inventa entomologica itineris Hispanici et Marrocani quod a 1926 fecerunt Harald et Hakan Lindberg. XIII. Hemiptera Heteroptera (excl. Capsidae et Hydrobiotica). Comment. Biol. Soc. Sci. Fennicae, vol. 3, no. 19, pp. 1–53, 3 figs., 2 pls.
1953. Hemiptera insularum Canariensium. *Ibid.*, vol. 14, no. 1, pp. 1–304.
1954. Zur Kenntnis der Hemipterenfauna der Azorischen Inseln. *Ibid.*, vol. 13, no. 18, pp. 1–9, 14 figs.
1963. Hemiptera insularum Madeirensium. *Ibid.*, vol. 24, no. 1, pp. 1–82, 10 figs.

LINNAVUORI, R.
1961. Hemiptera of Israel. II. Ann. Zool. Soc. "Vanamo," vol. 22, no. 7, pp. 1–51, 22 figs.

LINNÉ, C.
1758. Systema naturae. Editio decima, reformata. Stockholm, vol. 1, iv+823+1 pp.
1761. Fauna Suecica. Stockholm, xlvi+578 pp., 2 pls.

LUCAS, H.
1849. L'histoire naturelle des animaux articulés de l'Algerie. *In* Exploration scientifique de l'Algerie pendant 1840–1842. Paris, vol. 3, pp. 1–527.

MCATEE, W. L., AND J. R. MALLOCH
1922. Changes in names of American Rhynchota, chiefly Emesinae. Proc. Biol. Soc. Washington, vol. 35, pp. 95–96.
1923. Further notes on names of Emesinae and other Rhynchota. *Ibid.*, vol. 36, pp. 161–164.
1925. Revision of the American bugs of the reduviid subfamily Ploiariinae. Proc. U. S. Natl. Mus., vol. 67, no. 2573, pp. 1–135, 9 pls.
1926. Philippine and Malayan Ploiariinae (Hemiptera, Reduviidae). Philippine Jour. Sci., vol. 30, no. 1, pp. 117–152, 4 pls.

MACGILLIVRAY, D.
1914. [Notes on *Empicoris* (as *Ploiaria*).] Tijdschr. Ent., vol. 57, pp. xviii–xxiii.

MALDONADO C., J.
1948. Three new neotropical species of the reduviid genus *Ploiaria* Scopoli. Proc. Ent. Soc. Washington, vol. 50, no. 1, pp. 18–22, 16 figs.
1953. Five new neotropical species of *Ghilianella* (Hemiptera, Reduviidae). *Ibid.*, vol. 55, no. 4, pp. 189–195, 18 figs.
1960. Assassin bugs of the genus *Ghilianella* in the Americas (Hemiptera, Reduviidae, Emesinae). Proc. U. S. Natl. Mus., vol. 112, no. 3440, pp. 393–450, 146 figs.
1963. A new species of *Ghilianella* from Haiti (Hemiptera Reduviidae). Proc. Ent. Soc. Washington, vol. 65, no. 1, pp. 64–66, 11 figs.

MALDONADO C., J., AND T. H. FARR
1962. On some Jamaican Triatominae and Emesinae. Proc. Ent. Soc. Washington, vol. 64, no. 3, pp. 187–194, 19 figs.

MALLOCH, J. R.
1920. Additions to the recorded Illinois Reduviidae (Hem.). Ent. News, vol. 31, p. 240.

MAMET, J. R.
1957. A revised and annotated list of the Hemiptera (Heteroptera and Homoptera, excluding Sternorhyncha) of Mauritius. Mauritius Inst. Bull., vol. 5, no. 2, pp. 31–81.

MASSEE, A. M.
1954. The Hemiptera-Heteroptera of Kent. Trans. Soc. Brit. Ent., vol. 11, no. 12, pp. 245–280.
1963. The Hemiptera-Heteroptera of Kent. II. Proc. Trans. South London Ent. Nat. Hist. Soc., 1962, pp. 123–183.

MAY, B. M.
1963. New entomological records. New Zealand Ent., vol. 3, no. 2, pp. 44–53, 6 figs.

MENOZZI, C.
1940. Contributo alla fauna della Tripolitania. Boll. Lab. Zool. Portici, vol. 31, pp. 244–273, 7 figs.

MILLER, N. C. E.
1941. New genera and species of Malaysian Reduviidae. Supplementary records. Jour. Federated Malay States Mus., vol. 18, no. 5, pp. 774–804, 25 figs.
1948. New genera and species of Reduviidae from the Philippines, Celebes and Malaysia. Trans. Roy. Ent. Soc. London, vol. 99, no. 13, pp. 411–473, 77 figs.
1950. New genera and species of Reduviidae (Rhynchota) from Southern Rhodesia. Proc. Zool. Soc. London, vol. 12, no. 2, pp. 189–264, 72 figs.
1952. New Reduviidae in the collection of the British Museum (N. H.). VIII. Ann. Mag. Nat. Hist., ser. 12, vol. 5, pp. 539–552, 10 figs.
1953. Notes on the biology of the Reduviidae of Southern Rhodesia. Trans. Zool. Soc. London, vol. 21, no. 6, pp. 541–672, 58 figs., 9 pls.

1954a. New genera and species of Reduviidae (Hemiptera-Heteroptera). Comment. Biol. Soc. Sci. Fennicae, vol. 13, no. 17, pp. 1–69, 67 figs.
1954b. Hemiptera: Reduviidae. *In* British Museum (Natural History) Expedition to South-West Arabia. London, pp. 393–414, 14 figs.
1956. A new species of Emesinae (Hemiptera-Heteroptera: Reduviidae). Proc. Roy. Ent. Soc. London, ser. B, vol. 25, nos. 3–4, pp. 53–54, 1 fig.

MILLS, H. B.
1931. Notes on the oviposition of *Metapterus annulipes* (Stål) (Hemiptera, Reduviidae). Bull. Brooklyn Ent. Soc., vol. 26, p. 84, 1 fig.

MIYAMOTO, S.
1957. List of ovariole numbers in Japanese Heteroptera. Sieboldia, vol. 2, no. 1, pp. 69–82.
1959. Additions and correction to my "List of ovariole number in Japanese Heteroptera." *Ibid.*, vol. 2, no. 2, pp. 121–123.
1961. Comparative morphology of the alimentary organs of Heteroptera, with the phylogenetic consideration. *Ibid.*, vol. 2, no. 4, pp. 197–259, 294 figs.

MONTANDON, A. L.
1885. Description d'un Hémiptère-Hétéroptère nouveau et notes additionelles. Rev. d'Ent., vol. 4, pp. 113–115.

MONTROUZIER, P.
1855. Essai sur la faune de l'Ile de Woodlark ou Moiou. Ann. Soc. Agr. Lyon, ser. 2, vol. 7, pp. 1–114.
1864. [Descriptions.] *In* Perroud, B.-P., and Montrouzier, Essai sur la faune entomologique de Kanala (Nouvelle-Calédonie) et description de quelques espèces nouvelles ou peu connues. Ann. Soc. Linnéenne Lyon, ser. 2, vol. 11, pp. 46–257, pl. 1.

MULSANT, E., AND C. REY
1873. Réduvides-Emésides. Histoire naturelle des punaises de France. Paris, pp. 1–100, figs. 1–18.

MYERS, J. G.
1926. Biological notes on New Zealand Heteroptera. Trans. Proc. New Zealand Inst., vol. 56, pp. 449–511, 26 figs., pls. 81–86.

MYERS, J. G., AND W. E. CHINA
1928. A list of New Zealand Heteroptera, with the description of a remarkable green aradid, representing a new genus. Ann. Mag. Nat. Hist., ser. 10, vol. 1, pp. 377–394, 2 figs.

NATALE, G. DE
1850. Descrizione zoologiche d'una nuova specie de *Ploiaria* et di alcuni crostacei del porto di Messina. Messina [not paginated].

NOUALHIER, M.
1893. Voyage de M. Ch. Alluaud aux îles Canaries. 2e mémoire. Hémiptères gymnocerates et Hydrocorises. Ann. Soc. Ent. France, vol. 67, pp. 5–18.
1895. Note sur le genre *Ploiaria* Scop. Reut. (*Emesodema* Spin., *Cerascopus* Hein.) et description de quatre espèces nouvelles paléarctiques. Rev. d'Ent., vol. 14, pp. 166–170, 1 pl.

OSHANIN, B.
1870. [On Hemiptera of the Zerafshan Valley.] Bull. Imp. Soc. Lovers Nat. Sci. Anthrop. Ethnog., Moscow, vol. 8, pp. 194–213.
1908. Verzeichnis der paläarktischen Hemipteren mit besonderer Berücksichtigung ihrer Verteilung im russischen Reiche. Lfg. II. Ann. Mus. Zool. St. Petersburg, suppl., pp. 395–586.

PAIVA, C. A.
1919. Rhynchota from the Garo Hills, Assam. Rec. Indian Mus., vol. 16, pp. 350–377, pls. 34–36.

PARSHLEY, H. M.
1919. On some Hemiptera from western Canada. Occas. Papers Mus. Zool., Univ. Michigan, no. 71, 35 pp.

PASCOE, F.
1888. [Exhibit.] Proc. Ent. Soc. London, 1888, p. 1.

PAULIAN, R., AND A. GRJEBINE
1953. Une campagne spéléologique dans la réserve naturelle de Namoroka. Nat. Malgache, vol. 5, pp. 19–28, 4 figs.

PENDERGRAST, J. G.
1957. Studies on the reproductive organs of the Heteroptera with a consideration of their bearing on classification. Trans. Roy. Ent. Soc. London, vol. 109, no. 1, pp. 1–63, 122 figs.

PHILIPPI, E. A.
1862. Viaje a los baños i al nuevo volcán de Chillan por don Rodolfo Philippi. Comunicación del mismo a la Facultad de Ciencias Físicas. An. Univ. Chile, vol. 21, pp. 377–389.

PIZA, S. T., JR.
1939. Dois novos ploiariideos do Brasil (Hemiptera). Rev. Ent., vol. 10, no. 3, pp. 619–622, 8 figs.
1944. Duas novas espécies de ploiariideos

brasileiros (Hemiptera). *Ibid.*, vol. 15, nos. 1–2, pp. 135–138, 4 figs.

PORTER, C. E.
1923. Descripción de un nuevo hemíptero chileno. Rev. Chilena Hist. Nat., vol. 25, pp. 505–506.
1932. Acerca de algunos insectos chilenos. *Ibid.*, vol. 36, pp. 190–193, 1 fig.

PRIESNER, H., AND A. ALFIERI
1953. A review of the Hemiptera Heteroptera known to us from Egypt. Bull. Soc. Fouad Ier Ent., vol. 37, pp. 1–119.

PRIESNER, H., AND E. WAGNER
1961. Supplement to "A review of the Hemiptera Heteroptera known from Egypt." Bull. Soc. Ent. Egypte, vol. 45, pp. 323–339, 1 fig.

PROVANCHER, ABBÉ L.
1888. Petite faune entomologique du Canada. III. Les Hémiptères. Quebec, 354 pp., 5 pls.

PUTON, A.
1874. Hémiptères nouveaux. Petites Nouv. Ent., Paris, no. 110, pp. 439–440.
1876. [Descriptions.] *In* Lethierry, M., and A. Puton, Faunule des Hémiptères de Biskra. Ann. Soc. Ent. France, ser. 5, vol. 6, pp. 13–56.
1880. Synopsis des Hémiptères Hétéroptères de France. Paris, vol. 1, pt. 3, pp. 160–245.
1884. Notes hémiptérologiques. Rev. d'Ent., vol. 3, pp. 142–149.
1887. Hémiptères nouveaux ou peu connus de la faune paléarctique. *Ibid.*, vol. 6, pp. 96–105.
1889. [Descriptions.] *In* Noualhier, M., Excursions hémiptérologiques à Ténériffe et à Madère. *Ibid.*, vol. 8, pp. 293–310.

READIO, P. A.
1926. Studies on the eggs of some Reduviidae (Heteroptera). Univ. Kansas Sci. Bull., vol. 16, no. 4, pp. 157–179, pls. 9–11.
1927. Studies on the biology of the Reduviidae of America north of Mexico. *Ibid.*, vol. 17, no. 1, pp. 5-291, 21 pls.

REED, E. C.
1898–1901. Sinopsis de los hemípteros de Chile. Rev. Chilena Hist. Nat., pp. 1–107, 1 pl.

REUTER, O. M.
1881. Ad cognitionem Reduviidarum mundi antiqui. Acta Soc. Sci. Fennicae, vol. 12, pp. 271–339, 3 pls.
1887. Reduviidae novae et minus cognitae descriptae. Rev. d'Ent., vol. 6, pp. 149–167.
1888. Revisio synonymica Heteropterorum palaearcticorum quae descripserunt auctores vetustiores (Linnaeus 1758—Latreille 1806). Acta Soc. Sci. Fennicae, vol. 15, pp. 445–812.
1900. Quelques Hémiptères du Maroc. Bull. Soc. Ent. France, 1900, pp. 186–189.
1908. Charakteristik und Entwicklungsgeschichte der Hemipteren-Fauna (Heteroptera, Auchenorrhyncha und Psyllidae) der palaearktischen Coniferen. Acta Soc. Sci. Fennicae, vol. 26, no. 1, pp. 1–129.
1909. Ad cognitionem Reduviidarum palaearcticarum fragmenta. Öfvers. Finska Vetensk. Soc. Förhandl., vol. 51(A), no. 16, pp. 1–30.
1912. Hemipterologische Notizen. *Ibid.*, vol. 54(A), no. 7, pp. 1–76.

RIBES, J.
1961. Contribución al estudio de los Reduviidae de Cataluña. Misc. Zool., Barcelona, vol. 1, no. 4, pp. 57–73, 21 figs.
1963. Contribución al estudio de los Reduviidae de Cataluña. II. *Empicoris soror* (Pt.), nueva especie para la fauna europea. *Ibid.*, vol. 1, no. 5, pp. 45–47, 3 figs.

ROUBAUD, E., AND A. WEISS
1927. Note sur un Hémiptère Réduvide chasseur de moustiques et de Phlébotomes dans la Tunisie du nord. Arch. Inst. Pasteur, Tunis, vol. 16, pp. 81–83, 1 fig.

ROYER, M.
1923. Note sur le *Stenolemus novaki* Horváth (Hem. Reduviidae). Bull. Soc. Ent. France, 1922, pp. 321–322.

SAHLBERG, R. F.
1848. Monographia Geocorisarum Fenniae. Helsinki, xl+155 pp.

SAY, T.
1828. American entomology. Philadelphia vol. 3, [not paginated], pls. 37–54.
1831–1832. Descriptions of new species of heteropterous Hemiptera of North America. New Harmony, 39 pp.

SCHELLENBERG, J. R.
1800. Das Geschlecht der Land und Wasserwanzen. Zurich, pp. 1–32, 14 pls.

SCHOUTEDEN, H.
1905. [Descriptions.] *In* Bergroth, E., and H. Schouteden, Note sur les Hémiptères recueillies à Kinchassa par M. Waelbroeck. Ann. Soc. Ent. Belgique, vol. 49, pp. 379–389.
1913. Reduviidae, Nabidae et Pyrrhocoridae recueillis au Congo par le Dr. J. Bequaert. Rev. Zool. Africaine, ser. 2, vol. 2, pp. 232–248.

1928. Un nouvel eméside congolais. Rev. Zool. Bot. Africaines, vol. 16, pp. 343–345.
1944. Reduviidae, Emesidae, Henicocephalidae (Hemiptera Heteroptera). *In* Exploration du Parc National Albert—Mission G. F. de Witte (1933–1935). Brussels, fasc. 45, pp. 1–56, 22 figs.
1957. Contributions a l'étude de la faune entomologique du Ruanda-Urundi (Mission P. Basilewsky 1935). Ann. Mus. Congo Tervuren, zool., vol. 58, pp. 232–246.

SCHULZE, P.
1919. Eine Bethylide als Quälgeist des Menschen in Mazedonien. Sitzber. Gesell. Naturf. Fr. Berlin, 1919, pp. 378–381, 2 figs.

SCHUMACHER, F.
1911. Beschreibung einer neuen äthiopischen *Ploiariola*. Wiener Ent. Zeitg., vol. 30, p. 107.

SCHUMANN, W.
1934. Beiträge zur Biologie einiger Heteropteren. Mitt. Ent. Gesell. Halle, vol. 13, pp. 54–60, 1 pl.

SCOPOLI, I. A.
1786–1788. Deliciae florae et faunae Insubricae. Pavia, vol. 1 (1786), ix+85 pp., 25 pls.; vol. 2 (1786), [2]+115 pp., 25 pls.; vol. 3 (1788), [2]+87 pp., 25 pls.

SCOTT, J.
1874. Hemiptera-Heteroptera: Description of two new species of the family Emesidae. Ent. Monthly Mag., vol. 10, pp. 270–272.

SCUDDER, G. G. E.
1959. The female genitalia of the Heteroptera: morphology and bearing on classification. Trans. Ent. Soc. London, vol. 111, no. 14, pp. 405–467, 103 figs.

SIGNORET, V.
1852. Notice sur quelques Hémiptères nouveaux ou peu connues. Ann. Soc. Ent. France, ser. 2, vol. 10, pp. 539–544, 1 pl.
1858. Description d'un nouveau genre de la tribu des Longicoxes, Amyot et Serville, groupe des Emésides. *Ibid.*, ser. 3, vol. 6, pp. 251–253, pl. 6, fig. 1.
1863. Revision des Hémiptères du Chili. *Ibid.*, ser. 4, no. 3, pp. 541–588, pls. 11–13.

SMITH, J. B.
1910. A report on the insects of New Jersey. Hemiptera. Ann. Rept. New Jersey State Mus., 1909, pp. 131–170.

SOUTHWOOD, T. R. E.
1955. The egg and first instar larva of *Empicoris vagabundus* (L.) (Hem. Reduviidae). Ent. Monthly Mag., vol. 91, pp. 96–97, 1 fig.
1956. The structure of the eggs of the terrestrial Heteroptera and its relationship to the classification of the group. Trans. Roy. Ent. Soc. London, vol. 108, no. 6, pp. 163–221, 13 figs.
1961. A hormonal theory of the mechanism of wing polymorphism in Heteroptera. Proc. Roy. Ent. Soc. London, ser. A, vol. 36, pts. 4–6, pp. 63–66.

SOUTHWOOD, T. R. E., AND D. LESTON
1959. Land and water bugs of the British Isles. London and New York, ix+436 pp., 151 figs., 63 pls.

SPINOLA, M.
1840. Essai sur les insectes Hémiptères, Rhyngotes, ou Hétéroptères. Paris, 383 pp.
1850a. Tavola sinottica dei generi spettanti alla clase degli insetti artroidignati, Hemiptera, Linn. Latr.—Rhyngota, Fab.—Rhynchota, Burm. Modena, pp. 1–60.
1850b. Di alcuni generi d'insetti artroidignati nuovamente proposti dal socio attuale Signor Marchese Massimiliano Spinola nella sua tavola sinottica di questo ordine che precede la presente memoria. Modena, pp. 61–138.

STÅL, C.
1855. Hemiptera från Cafferlandet. Öfvers. K. Vetensk. Akad. Förhandl., vol. 12, pp. 27–47.
1859. Nova methodus Reduvina (Burm.) disponendi. Berliner Ent. Zeitschr., vol. 3, p. 328.
1860. Bidrag till Rio Janeiro-traktens hemipterfauna. K. Vetensk. Acad. Handl., vol. 2, no. 7, pp. 3–84.
1862. Synonymiska och systematiska anteckningar öfver Hemiptera. Öfvers. K. Vetensk. Akad. Förhandl., vol. 19, pp. 479–504.
1865. Hemiptera Africana. Stockholm, vol. 3, pp. 1–200.
1866. Analecta hemipterologica. Berliner Ent. Zeitschr., vol. 10, pp. 151–172, 381–394.
1871. Hemiptera insularum Philippinarum. Bidrag till Philippinska öarnes Hemipter-fauna. Öfvers. K. Vetensk. Akad. Förhandl., vol. 27, no. 7, pp. 607–776, pls. 7–9.
1872a. Genera Reduviidarum Europae disposuit. *Ibid.*, vol. 29, no. 6, pp. 43–48.
1872b. Enumeratio Hemipterorum, II. K. Svenska Vetensk. Akad. Handl., vol. 10, no. 4, pp. 3–159.

1874. Enumeratio Hemipterorum, IV. *Ibid.*, vol. 12, no. 1, pp. 4–186.

STICHEL, W.
1925–1938. Illustrierte Bestimmungstabellen der deutschen Wanzen. Berlin, ii+499 pp., 855 figs.

TAMANINI, L.
1962. Interessanti reperti emitterologici nella pianura padano-veneta (Heteroptera: Reduviidae et Lygaeidae). Mem. Mus. Civ. Stor. Nat. Verona, vol. 10, pp. 243–249, 16 figs.

TEODORO, G.
1921. Osservazioni sull'arto raptatorio di due emitteri *Emesodema domestica* Scop. e *Ploiaria vagabunda* L. Redia, vol. 14, pp. 43–45, 2 figs.

UESHIMA, N.
1963. Chromosome cytology of two species in Emesinae (Reduviidae: Hemiptera). Chromosome Information Serv., vol. 4, pp. 14–15, 7 figs.

UHLER, P. R.
1878. Notices of the Hemiptera Heteroptera in the collection of the late T. W. Harris, M.D. Proc. Boston Soc. Nat. Hist., vol. 19, pp. 365–446.
1884. Order VI—Hemiptera. *In* Kingsley, John Sterling (ed.), Standard natural history. Boston, vol. 2, pp. 204–296, figs. 286–343, 1 pl.
1886. Check list of the Hemiptera Heteroptera of North America. Brooklyn, 34 pp.
1893. A list of the Hemiptera-Heteroptera collected in the island of St. Vincent by Mr. Herbert H. Smith; with descriptions of new genera and species. Proc. Zool. Soc. London, 1893, pp. 705–719.
1896. Summary of the Hemiptera of Japan, presented to the United States National Museum by Professor Mitzukuri. Proc. U. S. Natl. Mus., vol. 19, pp. 255–297.

USINGER, R. L.
1941. Rediscovery of *Emesaya brevicoxa* and its occurrence in the webs of spiders (Hemiptera, Reduviidae). Bull. Brooklyn Ent. Soc., vol. 36, no. 5, pp. 206–208.
1946. Hemiptera Heteroptera of Guam. *In* Insects of Guam. Honolulu, vol. 2, pp. 11–103, 27 figs.
1951. Heteroptera of the Marshall Islands. Proc. Hawaiian Ent. Soc., vol. 14, no. 2, pp. 315–321.
1958. A new genus of Reduviidae from the Hawaiian Islands (Hemiptera). *Ibid.*, vol. 16, pp. 437–440, 1 fig.
1963. Animal distribution patterns in the tropical Pacific. *In* Gressitt, J. Linsley (ed.), Pacific Basin biogeography. Honolulu, pp. 255–261.

VAN DUZEE, E. P.
1916. Checklist of the Hemiptera of America north of Mexico. New York, x+111+2 pp.
1917. Catalogue of the Hemiptera of America north of Mexico. Univ. California Publ. Ent., vol. 2, xiv+902 pp.
1923. Expedition of the California Academy of Sciences to the Gulf of California in 1921. The Hemiptera (true bugs, etc.). Proc. California Acad. Sci., ser. 4, vol. 12, pp. 123–200.
1935. A second report on the Hemiptera-Heteroptera from the Marquesas. Bull. Bernice P. Bishop Mus., vol. 114, pp. 313–326, 3 figs.
1936. A report on some Heteroptera from the Hawaiian Islands, with descriptions of new species. Proc. Hawaiian Ent. Soc., vol. 9, no. 2, pp. 219–229.
1937. The Hemiptera of the Templeton Crocker Expedition to Polynesia in 1934–1935. Proc. California Acad. Sci., ser. 4, vol. 22, no. 4, pp. 111–126.

VILLIERS, A.
1943. Révision des *Ploearia* paléarctiques (Hem. Reduviidae). Bull. Mus. Natl. d'Hist. Nat., Paris, ser. 2, vol. 15, pp. 88–95, 28 figs.
1948. Hémiptères Réduviidés de l'Afrique Noire. *In* Faune de l'Empire français. Paris, vol. 9, pp. 1–489, 956 figs.
1949a. Révision des Emésides africains (Hémiptères Réduviides). Mém. Mus. Natl. d'Hist. Nat., new ser., vol. 23, no. 2, pp. 257–392, 337 figs.
1949b. Sur deux Émésines du Congo Belge (Hémiptères Réduviides). Rev. Française Ent., vol. 16, no. 3, pp. 145–147.
1949c. Hémiptères Réduvidées récoltées en Afrique Noire par J. Carayon. Rev. Zool. Bot. Africaines, vol. 42, no. 1, pp. 94–100.
1949d. Mission P. L. Dekeyser et A. Villiers en Guinée et Côte-d'Ivoire (1946). Insectes (Premiere partie). Cat. Inst. Français Afrique Noire, vol. 5, pp. 1–90, 9 figs.
1950. Hémiptères Réduviides récoltés en Angola par A. de Barros Machado. Publ. Cult. Co. Diamantes Angola, vol. 7, pp. 69–108, 13 figs.
1951. Notes d'entomologie ouest-africaine. II. Observations sur la répartition de quelques Hémiptères Hétéroptères et de-

scription de nouvelles espèces. Bull. Inst. Français Afrique Noire, vol. 13, no. 2, pp. 326–342, 10 figs.

1952a. Mission A. Villiers au Togo et au Dahomey (1950). VIII. Hémiptères Réduviides. *Ibid.*, vol. 14, no. 1, pp. 140–163, 7 figs.

1952b. La réserve naturelle intégrale du Mt. Nimba. XIV. Hémiptères Hétéroptères terrestres. Mém. Inst. Français Afrique Noire, vol. 19, pp. 289–309.

1952c. Hémiptères Réduviides récoltés an Angola par A. de Barros Machado (2ème note). Publ. Cult. Co. Diamantes Angola, vol. 14, pp. 17–40, 28 figs.

1953a. Emesinae cavernicoles du Congo Belge (Hemiptera Reduviidae). Rev. Zool. Bot. Africaines, vol. 47, nos. 1–2, pp. 31–33, 1 fig.

1953b. Les Réduviides de Madagascar. IX et X. Mém. Inst. Sci. Madagascar, vol. 3(E), pp. 33–39, 10 figs.

1954. Henicocephalidae et Reduviidae (Hemiptera). *In* Exploration du Parc National de l'Upemba. Mission G. F. de Witte. Brussels, vol. 18, pp. 1–54, 17 figs.

1956a. Le Parc National du Niokolo-Koba. Hémiptères. Mém. Inst. Français Afrique Noire, vol. 48, pp. 171–181, 3 figs.

1956b. Results from the Danish Expedition to the French Cameroons 1949–1950. III. Hémiptères Réduviides et Hénicocéphalides. Bull. Inst. Français Afrique Noire, vol. 18(A), no. 2, pp. 583–591, 3 figs.

1956c. Notes d'entomologie ouest-africaine. III. A propos du phototropisme positif chez les Réduviides. *Ibid.*, vol. 18(A), no. 4, pp. 1212–1214.

1957a. Mission du Muséum dans les îles du Golfe de Guinée. Entomologie: I. Un nouvel Emésine de São Tomé (Het. Reduviidae). Bull. Soc. Ent. France, vol. 62, nos. 1–2, pp. 54–55, 5 figs.

1957b. Notes d'entomologie ouest-africaine. VII. Hémiptères Réduviides nouveaux ou peu connues. Bull. Inst. Français Afrique Noire, vol. 19(A), no. 1, pp. 268–273.

1957c. Hémiptères Réduviides Emesinae récoltés aux îles Cap Vert par le Dr. H. Lindberg. Comment. Biol. Soc. Sci. Fennicae, vol. 16, no. 13, pp. 1–3, 2 figs.

1958. Sur quatre Emesinae du Musée royal du Congo Belge (Hemiptera Reduviidae). Rev. Zool. Bot. Africaines, vol. 58, nos. 3–4, pp. 277–280.

1959. Hémiptères Réduviides de Côte d'Ivoire. Bull. Inst. Français Afrique Noire, vol. 21(A), no. 1, pp. 326–345.

1960a. Mission zoologique de l'I.R.S.A.C. en Afrique orientale (P. Basilewsky et N. Leleup, 1957). XXXV. Hemiptera Reduviidae. Tribelocephalinae et Emesinae. Ann. Mus. Roy. Congo Belge, Sci. Zool., vol. 81, pp. 453–458, 6 figs.

1960b. Sur six nouveaux Hémiptères Réduviides de l'ouest africain. Bull. Inst. Français Afrique Noire, vol. 22(A), no. 1, pp. 267–275, 14 figs.

1960c. Hémiptères Réduviides récoltés au Tibesti par Ph. Bruneau de Miré. *Ibid.*, vol. 22(A), no. 4, pp. 1315–1330, 16 figs.

1960d. Notes synonymiques et descriptions de nouveaux Hémiptères Réduviides. *Ibid.*, vol. 22(A), no. 4, pp. 1331–1336, 7 figs.

1960e. Les Réduviides de Madagascar. XII. Récoltes de M. E. MacCallan. Bull. Acad. Malgache, new ser., vol. 36, pp. 17–29, 17 figs.

1961. Localisations et descriptions d'Emésides africains (Heteroptera Reduviidae). Rev. Zool. Africaine, vol. 63, nos. 1–2, pp. 33–65, 62 figs.

1962a. Sur quelques Hémiptères Réduviides de la République du Congo. Bull. Inst. Français Afrique Noire, vol. 24(A), no. 3, pp. 886–890, 10 figs.

1962b. Mission zoologique de l'I.R.S.A.C. en Afrique orientale. (P. Basilewsky et N. Leleup, 1957). LXXXIV. Hemiptera Reduviidae. Ann. Mus. Roy. Afrique Centrale, zool., no. 110, pp. 454–477, 26 figs.

1963. La réserve naturelle intégrale du Mont Nimba. XXV. Hemiptera Reduviidae. Mém. Inst. Français Afrique Noire, vol. 66, pp. 479–565, 43 figs.

1964. Reduviidae (Hemiptera Heteroptera). *In* Exploration du Parc National de la Garamba; Mission H. de Saeger. Brussels, fasc. 43, pp. 1–133, 56 figs.

WAGNER, E.

1952. Quarto contributo alla conoscenza della fauna emitterologica italiana. A. Bemerkenswerte Tingidae und Reduviidae aus Italien. Boll. Assoc. Romana Ent., vol. 7, no. 2, pp. 13–14.

WEED, C. M.

1889. Notes on *Emesa longipes* De Geer. Psyche, vol. 21, pp. 27–30.

WESTWOOD, J. O.

1846. Descriptions of some new exotic Reduviidae. Ann. Mag. Nat. Hist., vol. 17, p. 65.

WHITE, F. B.
1877. Descriptions of new species of heteropterous Hemiptera collected in the Hawaiian Islands by the Rev. T. Blackburn. No. 1. Ann. Mag. Nat. Hist., ser. 4, vol. 20, pp. 110–114.
1881. Descriptions of new species of heteropterous Hemiptera collected in the Hawaiian Islands by the Rev. T. Blackburn. No. 3. *Ibid.*, ser. 5, vol. 7, pp. 52–59.

WICKHAM, H. F.
1909. Notes on a thread-legged bug. Ottawa Nat., vol. 22, pp. 255–256.
1910. A note on *Emesa longipes*. Ent. News, vol. 21, pp. 27–30, pl. 4.

WOODWARD, T. E.
1954. New records and descriptions of Hemiptera-Heteroptera from the Three King Islands. Rec. Auckland Inst. Mus., vol. 4, no. 4, pp. 215–233, 2 figs.

WOLCOTT, G. N.
1936. Insectae Borinquensis. Jour. Agr. Univ. Puerto Rico, vol. 20, no. 1, pp. 1–600, illus.

WOLFF, J. F.
1811. Icones cimicum descriptionibus illustratae. Part 5. Erlangen, pp. i–viii, 167–214, pls. 17–20.

WYGODZINSKY, P.
1943. Contribuição ao conhecimento do gênero *Stenolemus* Signoret, 1858 (Ploiariinae, Reduviidae, Hemiptera). Rev. Brasileira Biol., vol. 3, no. 4, pp. 443–451, 25 figs.
1945a. Sôbre um novo gênero e uma nova espécie da subfamilia Emesinae (Reduviidae, Hemiptera). *Ibid.*, vol. 4, no. 4, pp. 539–544, 27 figs.
1945b. Notas sôbre Reduvioidea (Hemiptera). Rev. Ent., vol. 15, no. 3, pp. 342–351, 5 figs.
1945c. Notas e descrições de Emesinae neotropicais (Reduviidae, Hemiptera). Rev. Brasileira Biol., vol. 5, no. 2, pp. 247–262, 50 figs.
1945d. Duas espécies novas de Emesinae dos gêneros *Ploiaria* e *Rothbergia* (Reduviidae, Hemiptera). Rev. Ent., vol. 16, nos. 1–2, pp. 244–248, 14 figs.
1945e. Notas sôbre Reduviidae de Venezuela, com a descrição de uma nova espécie de Emesinae. Bol. Ent. Venezolana, Caracas, vol. 4, no. 3, pp. 149–152, 8 figs.
1946a. Sôbre o gênero *Metapterus* Costa, 1860, com notas sobre outros Emesinae neotropicais (Hemiptera). Rev. Ent., vol. 16, no. 3, pp. 462–470, 26 figs.
1946b. Sôbre um novo gênero de Harpactorinae do Brasil, com notas sobre os géneros *Harpactor* Laporte e *Erbessus* Stål (Reduviidae, Hemiptera). *Ibid.*, vol. 17, no. 3, pp. 401–416, 5 figs., 7 pls.
1947a. Sôbre duas novas espécies de Emesinae do Brasil, com notas sôbre *Stenolemoides arizonensis* (Banks) (Reduviidae, Hemiptera). Rev. Brasileira Biol., vol. 6, no. 4, pp. 509–519, 56 figs.
1947b. Novas contribuições ao conhecimento dos *Stenolemus* das Américas (Emesinae, Reduviidae, Hemiptera). *Ibid.*, vol. 7, no. 1, pp. 127–144, 30 figs.
1947c. Contribution towards the knowledge of the genus *Malacopus* Stål, 1860, with the description of two new species (Emesinae, Reduviidae, Hemiptera). Rev. Ent., vol. 17, no. 3, pp. 457–467, 29 figs.
1947d. Contribuição ao conhecimento do gênero *Heniartes* Spinola 1837 (Apiomerinae, Reduviidae, Hemiptera). Arq. Mus. Nac., vol. 41, pp. 3–65, 216 figs.
1948a. Note on *Megaploiaria* McAtee & Malloch, 1926, with the description of a new species from Australia (Emesinae, Reduv., Hem.). Ent. Meddel., vol. 25, pp. 231–236, 14 figs.
1948b. On some Reduviidae belonging to the Naturhistorisches Museum at Vienna (Hemiptera). Rev. Brasileira Biol., vol. 8, no. 2, pp. 209–224, 54 figs.
1948c. Sôbre alguns Reduviidae da região amazônica (Hemiptera). Rev. Ent., vol. 19, no. 3, pp. 557–564, 17 figs.
1948d. Über die Verbreitung und Synonymie von *Ploiaria dohrni* (Signoret, 1863) (Hemipt., Reduviidae). Mitt. Schweizerischen Ent. Gesell., vol. 21, no. 3, pp. 471–475, 3 figs.
1949a. Reduvioidea from New South Wales. Description of a remarkable new genus and species of Emesinae (Reduviidae, Hemiptera). Rev. Brasileira Biol., vol. 9, no. 2, pp. 217–222, 19 figs.
1949b. Elenco sistemático de los Reduviiformes americanos. Monogr. Inst. Med. Regional Tucumán, vol. 1, pp. 1–102.
1950a. Reduvioidea from New South Wales. Notes and descriptions (Hemiptera). Proc. Linnean Soc. New South Wales, vol. 75, nos. 1–2, pp. 81–88, 34 figs.
1950b. Sôbre alguns Emesinae (Reduviidae, Hemiptera). Rev. Brasileira Biol., vol. 10, no. 1, pp. 73–84, 47 figs.
1950c. Contribution towards the knowledge of the Emesinae (Reduviidae, Hemiptera).

Ibid., vol. 10, no. 2, pp. 241–251, 60 figs.

1950d. Sobre el género *Bergemesa* nov. (Emesinae, Reduviidae, Hemiptera). An. Soc. Cient. Argentina, vol. 150, pp. 28–45, 58 figs.

1950e. Sobre el género *Palacus* Dohrn, 1863 (Emesinae, Reduviidae, Hemiptera). Bol. Ent. Venezolana, Caracas, vol. 8, nos. 3–4, pp. 103–114, 22 figs.

1951a. Sôbre algumas espécies do gênero *Ghilianella* Spinola, 1850 (Emesinae, Reduviidae, Hemiptera). Rev. Brasileira Biol., vol. 11, no. 2, pp. 223–226, 18 figs.

1951b. On *Bargylia* Stål, 1865, *Pseudobargylia* gen. nov. and *Leistarches serripes* Dohrn, 1860 (Emesinae, Reduviidae: Hemiptera). Ann. Mag. Nat. Hist., ser. 12, vol. 4, pp. 609–617, 17 figs.

1951c. Contribución al conocimiento del género *Metapterus* Costa, 1860, de las Américas y de Juan Fernández (Hemiptera Reduviidae). Rev. Chilena Ent., vol. 1, pp. 113–128, 43 figs.

1952a. Note on some Emesinae (Reduviidae, Hemiptera) from Israel. Bull. Res. Council Israel, vol. 1, no. 4, pp. 102–104, 20 figs.

1952b. Los insectos de las Islas Juan Fernández. 2. Reduviidae y Cimicidae (Hemiptera). Rev. Chilena Ent., vol. 2, pp. 15–19, 6 figs.

1952c. On some Emesinae from South Africa (Reduviidae, Hemiptera). Jour. Ent. Soc. South Africa, vol. 15, no. 2, pp. 150–158, 28 figs.

1953. On a new species of *Eugubinus* Distant, 1903, with notes on the genus (Emesinae, Reduviidae, Hemiptera). Dominion Mus. Rec. Ent., vol. 1, no. 10, pp. 213–218, 14 figs.

1954a. On some Emesinae from Equatorial Africa (Reduviidae, Hemiptera). Ann. Mus. Congo Tervuren, vol. 1, pp. 569–573, 23 figs.

1954b. Apuntes sobre Emesinae americanas (Reduviidae, Hemiptera). Acta Zool. Lilloana, vol. 14, pp. 281–315, 73 figs.

1956. Synopsis of the Australian Emesinae (Hemiptera: Reduviidae). Univ. California Publ. Ent., vol. 11, no. 4, pp. 193–246, 233 figs.

1958a. Hemiptera Heteroptera Emesinae. *In* Hanström, Bertil, P. Brinck, and G. Rudebeck (eds.), South African animal life. Uppsala, vol. 5, pp. 113–149, 142 figs.

1958b. New and little-known Emesinae (Reduviidae, Hemiptera) in the British Museum (Natural History), London. Bull. Brit. Mus. (Nat. Hist.), Ent., vol. 7, no. 6, pp. 329–346, 68 figs.

1960a. Notas y descripciones de Reduviidae bolivianas (Hemiptera). Acta Zool. Lilloana, vol. 17, pp. 293–320, 44 figs.

1960b. On four new species of *Schidium* (Emesinae, Reduviidae, Hemiptera) from Angola. Publ. Cult. Co. Diamantes Angola, vol. 52, pp. 57–63, 56 figs.

WYGODZINSKY, P., AND J. W. ABALOS

1950. Sobre algunos *Stenolemus* americanos (Emesinae, Reduviidae, Hemiptera). An. Inst. Med. Regional Tucumán, vol. 3, no. 1, pp. 99–110, 20 figs.

WYGODZINSKY, P., AND R. L. USINGER

1960. Heteroptera: Reduviidae. *In* Gressitt, Judson Linsley (ed.), Insects of Micronesia. Honolulu, vol. 7, no. 5, pp. 231–283, 27 figs.

ZIMMERMAN, E. C.

1948. Heteroptera. *In* Insects of Hawaii. Honolulu, vol. 3, pp. 1–255, figs. 1–110.

INDEX OF SCIENTIFIC NAMES

Page numbers in boldface type refer to the main references for valid names when more than one page is cited.